Digitized by the Internet Archive
in 2019 with funding from
Getty Research Institute

https://archive.org/details/geographicalrevi7191unse

THE
GEOGRAPHICAL REVIEW

VOLUME VII

JANUARY–JUNE, 1919

PUBLISHED BY

THE AMERICAN GEOGRAPHICAL SOCIETY
BROADWAY AT 156th STREET
NEW YORK

Press of
Douglas Taylor & Co.
New York

THE GETTY CENTER
LIBRARY

49614

AMERICAN GEOGRAPHICAL SOCIETY

OFFICERS AND COUNCILORS FOR 1919

President

JOHN GREENOUGH

Vice-Presidents

PAUL TUCKERMAN
Term expires 1920

JAMES B. FORD
Term expires 1922

Foreign Corresponding Secretary

PROFESSOR WILLIAM LIBBEY
Term expires 1921

Domestic Corresponding Secretary

ARCHIBALD D. RUSSELL
Term expires 1920

Recording Secretary

HAMILTON FISH KEAN
Term expires 1922

Treasurer

HENRY PARISH
Term expires 1920

Director and Editor

ISAIAH BOWMAN, Ph.D.

Councilors

MADISON GRANT
GRENVILLE KANE
ALLISON V. ARMOUR
PHILIP W. HENRY
ALEXANDER HAMILTON RICE, M.D.
Terms expire 1920

BANYER CLARKSON
EDWIN SWIFT BALCH
W. REDMOND CROSS
WALTER B. JAMES, M.D.
H. STUART HOTCHKISS
Terms expire 1921

LEVI HOLBROOK
ARCHER M. HUNTINGTON
CHARLES A. PEABODY
Terms expire 1922

Associate Editor

W. L. G. JOERG

Assistant Editors

G. M. WRIGLEY, Ph.D.
GEORGE M. McBRIDE

Contributing Editors

ALBERT PERRY BRIGHAM, A.M., Colgate University
WILLIAM M. DAVIS, Hon. D.Sc., Ph.D., Harvard University
WILLIAM CHURCHILL, F.R.A.I., The Carnegie Institution of Washington
EDWARD L. STEVENSON, Ph.D., Hispanic Society of America
ROBERT DeC. WARD, A.M., Harvard University
RICHARD E. DODGE, A.M., Teachers College, Columbia University
ELLSWORTH HUNTINGTON, Ph.D., Milton, Mass.
MARK JEFFERSON, A.M., State Normal College, Ypsilanti, Mich.
DOUGLAS WILSON JOHNSON, Ph.D., Columbia University

OBJECTS OF THE SOCIETY

The objects of the American Geographical Society are to collect and disseminate geographical information by discussion, lectures, and publications; to establish in the chief city of the United States a place where may be obtained accurate information on every part of the globe; and to encourage such exploring expeditions as seem likely to result in valuable discoveries in geography and the related sciences.

The American Geographical Society is the oldest geographical society in the United States. When it was founded, in 1852, there were but twelve similar societies in the world. Now it exchanges publications with more than four hundred scientific associations. The Society issues two monthly magazines of unusual appeal, *The Geographical Review,* which contains authoritative articles of general interest, and *The Journal of Geography,* which is devoted to the educational aspect of the subject. It has also a large and growing library—one of the most important geographical libraries of the world; thousands of maps and charts; and a remarkable collection of atlases of the sixteenth, seventeenth, and eighteenth centuries.

Travelers, men of science, and others properly accredited are welcome at the rooms of the Society and may freely use the book and map collections.

Two gold medals have been founded by the Society, the *Cullum Geographical Medal* and the *Charles P. Daly Medal,* which are awarded from time to time to explorers, writers, and men of science who have contributed to the advance of geographical knowledge.

In addition it awards the *David Livingstone Centenary Medal,* founded by the Hispanic Society of America.

The qualifications for Fellowship are an interest in exploration and travel, in the spread of geographical knowledge, and in the advancement of science.

A Fellow is entitled to the use of the library, reading and map rooms; to admission to all lectures and exhibitions; to *The Geographical Review;* and to the Society's special publications, which include occasional books and maps.

The annual dues are ten dollars.

FORM OF BEQUEST

I do hereby give and bequeath to the American Geographical Society of New York..

TABLE OF CONTENTS

PRINCIPAL ARTICLES

North America

PAGES

—— American Geographical Society's Contribution, The, to the Peace Conference. (1 insert map) 1–10
—— Association of American Geographers, The Baltimore Meeting of the 107–109
Atwood, W. W. Geography in America 36–43
Belden, C. J. The Tioga Road Across the Sierra Nevada. (1 map and profile, 8 photos) 377–386
Bent, A. H. The Unexplored Mountains of North America 403–412
Emerson, F. V. The Southern Long-leaf Pine Belt. (1 map, 6 photos) 81–90
Harshberger, J. W. Alpine Fell-fields of Eastern North America. (2 maps, 10 photos) 233–255
Nichols, G. E. Raised Bogs in Eastern Maine. (2 photos) 159–167
Richardson, H. W. The Northeastern Minnesota Forest Fires of October 12, 1918. (2 maps, 1 diagr., 2 photos) 220–232
Ward, R. DeC. Frost in the United States. (3 maps) 339–344
Ward, R. DeC. Rainy Days and Rain Probability in the United States. (2 maps) 44–48

South America

Wrigley, G. M. Fairs of the Central Andes. (1 map, 3 photos) 65-80

Europe

Davis, W. M. The Young Coasts of Annam and Northern Spain 176–180
Marinelli, Olinto. The Regions of Mixed Populations in Northern Italy. (1 insert map in color) 129–148
—— Germany, The New Boundaries of, According to the Peace Treaty. (1 insert map) 281–290
Nordenskiöld, Erland. Finland: The Land and the People. (2 text maps in color, 8 photos) 361–376
Stanoyevich, M. S. The Ethnography of the Yugo-Slavs 91–97

Africa

Ross, Emory. The Climate of Liberia and Its Effect on Man. (4 photos) 387–402

Asia

Davis, W. M. Drainage Evolution on the Yünnan-Tibet Frontier 413–415
Davis, W. M. The Young Coasts of Annam and Northern Spain 176–180
Huntington, Ellsworth. The Future of Palestine. (1 map) 24–35
Tisdale, Alice. The Enchantment of the Old Order [Silk and rice industries in China]. (14 photos) 11–23

Australasia and Oceania

Taylor, Griffith. Air Routes to Australia. (3 maps) 256–261

Polar Regions

PAGES

Brown, R. N. Rudmose. Spitsbergen, *Terra Nullius.* (1 map) 311–321

Stefánsson, Vilhjálmur. "Living Off the Country" as a Method of Arctic Exploration. (15 photos) 291–310

General

Babcock, W. H. The Island of the Seven Cities. (3 maps) 98–106

Brigham, A. P. Principles in the Determination of Boundaries 201–219

Fenneman, N. M. The Circumference of Geography. (1 diagr.) 168–175

Gilbert, A. H. Pierre Davity: His Geography and Its Use by Milton 322–338

Woodhouse, Henry. High-Altitude Flying in Relation to Exploration. (2 diagrs., 4 photos) 149–158

DEPARTMENTS

Geographical Record .... 49–53 (1 diagr.), 110–118 (1 insert map, 2 text maps), 181–187 (1 map), 262–268, 345–349, 416–421.

Geographical Publications .... 54–64, 119–128, 188–200, 269–280 (2 maps), 350–360, 422–432.

Officers and Councilors of the American Geographical Society for 1919 iii

Objects of the Society iv

Index 433–471

Errata 472

Separate Illustrations

[Base map of] Tyrol, 1:1,000,000 .... Pl. I, opp. p. 8

[Map of] Proposed Subdivision of England into Provinces, 1:3,000,000. Pl. II, opp. p. 114

Ethnographic Map of the Frontier Zone of Northern Italy, by Olinto Marinelli, 1:1,500,000 .... Pl. III, opp. p. 144

[Map of Germany showing the territorial changes prescribed by the peace treaty, 1:5,000,000], with three insets: I, Slesvig Plebiscite; II, Free City of Danzig; III, Adjoining Circles in E. & W. Prussia .. Pl. IV, opp. p. 288

THE
GEOGRAPHICAL REVIEW

VOL. VII JANUARY, 1919 NO. 1

THE AMERICAN GEOGRAPHICAL SOCIETY'S CONTRIBUTION TO THE PEACE CONFERENCE

[With separate map, Pl. I, facing p. 8.]

During the past year the American Geographical Society rendered a public service which is unique in the history of the country. Its building was the headquarters of the peace conference organization known as the "Inquiry." Secretary Lansing inspected the work on two occasions, and on October 12, at the time of the Fourth Liberty Loan celebration, President Wilson spent an hour in examining the maps, graphs, and reports which had been in preparation for nearly a year. The organization included about one hundred and fifty persons, among them distinguished historians, economists, geographers, and men of affairs. Every scientific bureau in Washington co-operated in the work in the most cordial manner; likewise the Military Intelligence Division of the General Staff, the National Research Council, the Tariff Commission, the Department of Commerce, and the various War Boards. Never before had there been gathered together so large a body of men engaged in public service of an international character. To have been the headquarters of such an enterprise is at once a privilege and a distinction.

Most of the third floor, all of the fourth floor, and various other parts of the Society's building were occupied by members of the Inquiry and its staff. The Society's library and map collection and its other facilities for research were placed at the disposal of the commission. There could be no greater justification of the Society's existence than the use to which its collections and the results of its long labors in the domain of scientific geography have been put—a use which will have an international influence.

While the Inquiry took up its headquarters with the American Geographical Society in November, 1917, it has not before been possible to refer to these relations because of the confidential nature of the work. In March, 1918, public mention was made of the existence of the Inquiry in a book entitled "The Real Colonel House," by Arthur D.

Copyright, 1919, by the American Geographical Society of New York

Howden Smith, which had previously appeared serially in the *New York Evening Post*. In the chapter dealing with the Inquiry reference was made to the Society's connection, but only now has it become possible to make a fuller statement. First, however, it may be of interest to describe briefly how the Inquiry began.

The Organization of the Inquiry

In September, 1917, as a result of conferences between Colonel E. M. House and President Wilson, Colonel House was authorized to organize forces to gather and prepare for use at the peace conference the most complete information possible, from the best and latest sources, for consideration by the peace commissioners. The expenses were provided for from the special emergency fund placed by Congress at the President's disposal. Colonel House held preliminary conferences with Dr. S. E. Mezes, President of the College of the City of New York, Professor James T. Shotwell of Columbia University, and Professor Archibald C. Coolidge of Harvard University about the broad lines of the work and its organization, which after a time became known officially as the Inquiry.

It was soon evident that the scope of the Inquiry would demand not only a personnel of size and quality hitherto unknown in any such work but headquarters where safety of records and secret documents from enemy activity could be assured. There was also needed an already established organization for many kinds of research, map making, etc., which could be immediately utilized. This problem was finally solved when the American Geographical Society placed its building at 156th Street and Broadway and a part of its staff, including its Director, Dr. Isaiah Bowman, at the disposal of the Inquiry, without cost.

The work from that date, November 10, 1917, proceeded under careful guard night and day. Such measures were considered vital owing to experiences at other peace conferences, notably that after the Franco-Prussian War. It was considered necessary, also, to abstain from publication of details of the work of the Inquiry until its results were safely on shipboard. A large part of them left for Europe on the *George Washington* on December 4. Other results of the work were already in Paris, where Colonel House had been arranging the preliminaries of the forthcoming conference.

Similar inquiries had been in progress abroad, especially in France and England. There had been frequent conferences for delivery of material and exchange of views, marked by a spirit of friendly co-operation throughout. Some of the material from Europe, such, for example, as the complete texts of important treaties signed since the beginning of the war, has never been made public.

Primarily the Inquiry has been a fact study, conducted in a scientific spirit by specialists and scholars, both American and from various European countries affected by the war. In order to give high value to any statement of fact, the Inquiry has been entirely independent of any political hypothesis.

PERSONNEL

Among the personnel of the Inquiry are:

S. E. MEZES, President of the College of the City of New York, *Director.*

ISAIAH BOWMAN, Director of the American Geographical Society, *Chief Territorial Specialist.*

ALLYN A. YOUNG, Head of the Department of Economics at Cornell University, *Specialist on Economic Resources.*

CHARLES H. HASKINS, Dean of the Graduate School of Harvard University, *Specialist on Alsace-Lorraine and Belgium.*

CLIVE DAY, Head of the Department of Economics at Yale University, *Specialist on the Balkans.*

W. E. LUNT, Professor of History, Haverford College, *Specialist on Northern Italy.*

R. H. LORD, Professor of History at Harvard University, *Specialist on Russia and Poland.*

CHARLES SEYMOUR, Professor of History at Yale University, *Specialist on Austria-Hungary.*

W. L. WESTERMANN, Professor of History at the University of Wisconsin, *Specialist on Turkey.*

G. L. BEER, formerly of Columbia University, *Specialist on Colonial History.*

MARK JEFFERSON, Professor of Geography, Michigan State Normal College, *Cartographer.*

ROLAND B. DIXON, Professor of Anthropology at Harvard University.

In addition there were eleven assistants and four commissioned officers of the Military Intelligence Division assigned to the Inquiry for special problems on strategy, economics, and ethnography. These officers were:

MAJOR D. W. JOHNSON, Columbia University.
MAJOR LAWRENCE MARTIN, University of Wisconsin.
CAPTAIN W. C. FARABEE, The University Museum, Philadelphia.
CAPTAIN STANLEY K. HORNBECK, University of Wisconsin.

This entire personnel, except Majors Johnson and Martin and Captain Farabee, together with map makers and other assistants sailed on December 4 with the peace commission on the *George Washington.*

In its latest stages the Inquiry had its work centered on territorial matters, so that all the specialists who went abroad are territorial specialists, except the direct representatives of the State Department. Part of the force in international law was already in Europe, including David H. Miller, chairman of the Law Committee of the State Department.

SOURCES OF INFORMATION

Every important nationality of Europe and Western Asia has had representatives in New York for conference with the Inquiry. Authorities native to the affected countries in Europe lent their aid and placed at the disposal of the Inquiry all sources of information in their native languages. These, together with numerous secret documents and much information hitherto unavailable to scholars, resulted in a bibliographic collection altogether unique and valuable. It will become part of the records of the State Department.

SUBJECTS OF INVESTIGATION

Passing by the countless details, the Inquiry, broadly, has covered the following fields:

1. *Political History.*
    - (a) Historic rights, including suffrage laws.
    - (b) Religious development and customs.
    - (c) Rights of minority peoples in composite populations; subordinate nationalities.
2. *Diplomatic History.*
    - (a) Recent political history related to diplomacy, treaties, etc.
    - (b) Public law, constitutional reforms.
3. *International Law.*
    - (a) Reconciliation of present and former practices and determination of basic principles.
    - (b) Study of treaty texts since the beginning of the war.
    - (c) Geographical interpretation of problems of territorial waters, frontiers, etc.
4. *Economics.*
    - (a) International: raw materials, coaling stations, cable stations, port works, tariffs and customs unions, free ports, open ports.
    - (b) Regional: industrial development, self-sufficiency, traffic routes in relation to boundaries and material resources, including food, minerals, water power, fuel, etc.
5. *Geography.*
    - (a) Economic geography.
    - (b) Political geography: strategic frontiers; topographic barriers.
    - (c) Cartography: maps to illustrate every kind of distribution that bears on peace problems, such as: (a) peoples, (b) minerals, (c) historical limits, (d) railways and trade routes, (e) crops and live stock, (f) cities and industrial centers, (g) religions.
    - (d) Irrigation: present development; possibilities in general reconstruction.
6. *Education.*
    - (a) Status in colonial possessions.
    - (b) Condition in backward states.
    - (c) Opportunities of oppressed minorities.

PREPARATION OF MAPS

The cartographic force of the American Geographical Society, greatly augmented by Government aid, began a map-making program hitherto without precedent in this country, all work being carefully drawn from the latest and best sources. Maps were made to visualize not only all manner of territorial boundaries but distribution of peoples, populations and their local densities, religions, economic activities, distribution of material resources, trade routes, both historic and potential strategic points, etc.

BASE MAPS OF PROBLEM AREAS

In addition there was prepared by the American Geographical Society a series of base maps and block diagrams, the most nearly complete in existence, bearing upon all the geographical problems both of the war and the peace which is to follow. These were engraved and printed and then used for the plotting of racial, historical, economic, and other data needed to illustrate the investigations being carried on. The maps show mainly drainage, railways, administrative divisions, and a large number of places; some include relief. The block diagrams are bird's-eye views of the type commonly in use for the exposition of physiographic problems; they show the configuration of the surface in a remarkably plastic manner. The territory represented covers Europe, Asia, and Africa, each area being mapped in the detail required by its problems.

This unique series of base maps is so important that it was adopted by the War Department and prescribed by its Committee on Education and Special Training for use in all colleges and universities where units of the Students Army Training Corps are located. Every such institution has received a set of maps for use in its so-called War Issues Course, and in other courses in which the geographical problems of the war and the coming peace are discussed. After peace has been signed the maps will continue to be of value as permanent aids in the study of geography, history, and economics. A small-scale edition of each of these maps (a sample accompanies the present announcement as Pl. I) has also been printed and distributed, so that the same map is available in wall-map form for demonstration by the instructor and in desk-map form for use by the student.

The Committee on Education and Special Training of the War Department issued a circular regarding these maps which was sent to all the S. A. T. C. institutions in the United States. This circular, which contains additional information about the series, reads as follows:

C.e.22.

WAR DEPARTMENT
COMMITTEE ON EDUCATION AND SPECIAL TRAINING
SECTION OF TRAINING AND INSTRUCTION BRANCH
WAR PLANS DIVISION, GENERAL STAFF
OLD LAND OFFICE BUILDING, 8TH AND F STREETS
WASHINGTON

November 8, 1918.

FROM: Committee on Education and Special Training.
TO: Institutions where Units of the Students Army Training Corps are located and Chairmen of the War Issues Course groups.
SUBJECT: Maps for the War Issues Course and for other courses in which the Geographical Problems of the War and the Peace which is to follow have a part.

During the past year the American Geographical Society of New York has been preparing a series of base maps for the United States Government. The building of the

Society has been the headquarters of the "Inquiry," an organization engaged in a study of world conditions, and especially European conditions, that bear upon the problems of the coming peace conference. Probably never before in the history of the United States has there been gathered together so large an organization of scholars for a national purpose. A large force of draftsmen and cartographers has been engaged on this task for over a year. The maps which have been prepared are not cheap and hasty productions, but carefully drawn compilations from the latest and best sources.

1. GENERAL DESCRIPTION OF THE MAPS; THEIR USEFULNESS: The Committee on Education and Special Training has been fortunate enough to secure the generous co-operation of the American Geographical Society in making available for use in the War Issues Course this unique series of maps and block diagrams of the problem areas of the world. The maps, many of which are wall-size, make in all about sixty sheets. All of the maps are on a large scale and all have been re-engraved in a series of small maps which may be ordered by the hundred or the thousand as desired for the direct use of the students. With the large base map before the class and the small maps in the hands of the students, there will be sound instruction in geographical problems. Upon the base maps lines may be drawn and colors laid to show distributions of every sort. If it is desired to show a battle line, a new state, an ethnic boundary, a rectified frontier, in short any fact which a map may display, there is a base map at hand for the purpose. No available commercial maps have the qualities which these maps exhibit and which make them so readily serviceable for the work of the colleges.

2. PRICE OF MAPS; OPPORTUNITY FOR EXAMINATION: The maps will be sold in complete sets at the nominal price of twelve dollars ($12.00), carriage prepaid (which price merely covers the cost of manufacture). The prompt possession of these maps is so important to the War Issues Course that the Committee on Education and Special Training has directed the American Geographical Society to send a set on approval to each institution maintaining a unit of the S. A. T. C. *Institutions should either return the set within a few days or remit the sum of twelve dollars ($12.00) to the American Geographical Society, Broadway and 156th Street, New York City.* As many additional sets as are wanted may be ordered direct from the same address. It is hoped that the larger institutions will order several additional sets, for the Committee believes these maps to be essential to the proper conduct of the War Issues Course and of other "war courses" in history, economics, and government. Moreover, it is believed that the maps will promote instruction in the objects and terms of peace, in reconstruction to follow the war, and in world problems of every variety in which the United States will inevitably be involved in future years.

3. USE OF FUNDS: With the funds received from the sale of these maps other maps will be drafted and engraved and thus the series kept almost up to the minute. In this way, every college in the country may carry on a connected series of map studies and put geography instruction on a high scientific plane.

4. WIDE DISTRIBUTION OF MAPS DESIRED: It is also proposed to supply the series to newspapers and periodicals, and to agencies of every sort for the diffusion of knowledge. A new educational door has been opened. Public interest in maps and geography, which the war has largely increased, should be maintained by every educational agency. Every citizen should follow the principles and the details of the settlement of the war intelligently. For most persons the map language is a new language. In the past four years of war the public has learned to read and understand maps. The present series is a first step in popular education in national and international ideas and plans through the language of the map.

5. DESCRIPTIVE MATTER: Later in the year the Committee will follow up the maps with descriptive matter which will enable each instructor to modify the base maps

now supplied with fresh and timely material. The maps should be regarded as a first step in a series of geographical publications which will be carried out through the co-operation of the Committee and the American Geographical Society.

6. CORRESPONDENCE REGARDING MAPS: *All correspondence about the maps listed and described below should be addressed to Dr. Isaiah Bowman, Director of the American Geographical Society, Broadway and 156th Street, New York City.*

COMMITTEE ON EDUCATION AND SPECIAL TRAINING,
By Frank Aydelotte,
Director of War Issues Course.

DETAILED DESCRIPTION

EUROPE.
Scale: 1:3,000,000.
Size: 61 x 73 inches, in four sheets.

A general map of Europe, showing relief generalized from the best available sources and represented by hachures.

This map is also printed in sections on the same scale in sheets 15 x 25 inches, as follows:

Austria-Hungary: 6° — 30° E, 41° — 52° N.
Balkans: 11° — 34° E, 32° — 46° N.
Caucasus: 32° — 54° E, 37° — 47° N.
France: 10° W — 15° E, 42° — 52° N.
Germany: 2° W — 24° E, 46° — 56° N.
Italy: 0° — 23° E, 36° — 47° N.
Turkey: 26° — 48° E, 32° — 42° N.
Western Russia: 16° — 44° E, 44° — 70° N.

ALSACE.
Scale: 1:250,000.
Size: 24 x 38 inches (5°25′ — 8°40′ E, 47°20′ — 48°40′ N).

LORRAINE.
Scale: 1:250,000.
Size: 24 x38 inches.

These two maps are so arranged that they can be joined, thus securing a detailed map of the whole region.

ADRIATIC.
Scale: 1:3,000,000.
Size: 11½ x 15 inches (10° — 23° E, 39° — 47° N).

Especially useful in the study of the relations between Italy and the Yugo-Slavs, Italy and Albania, etc.

TYROL.
Scale: 1:500,000.
Size: 20½ x 27 inches (9°30′ — 13°45′ E, 45°30′ — 48° N).

This map covers Italy's aspirations to the north. The names of places mentioned in the negotiations with Austria preceding Italy's entrance into the war are included, which permits the student to follow the various claims and offers in detail.

AUSTRIA-HUNGARY.
Scale: 1:2,500,000.
Size: 15 x 25 inches (9° — 30° E, 42° — 51° N).

A convenient map for the study of Austro-Hungarian problems. Administrative divisions are shown in most of the disputed regions.

AUSTRIA-HUNGARY.
Scale: 1:1,000,000.
Size: 42 x 67 inches, in two sheets (10° — 30° E, 42° — 51° N).

This map is especially suitable for classroom purposes on account of its large size.

BALKANS.
Scale: 1:3,000,000.
Size: 16 x 19½ inches (13° — 30° E, 36° — 46°30′ N).
An excellent base for the study of Balkan problems, and especially for ethnography and zones of civilization.

BALKANS.
Scale: 1:2,000,000.
Size: 24 x 29 inches (13° — 30° E, 36° — 46°30′N).
The same map as the above, but on a larger scale.

BALKANS.
Scale: 1:1,000,000.
Size: 46 x 64 inches, in two sheets (13° — 30° E, 35° — 47° N).
Another enlargement of the 1:3,000,000 mentioned above, suitable for the classroom. It should be noted that these maps extend as far north as Trieste. Railroads are not shown.

BALKANS.
Scale: 1:2,500,000.
Size: 14 x 18 inches (19° — 29° E, 36° — 46° N).
This map covers the Balkan peninsula proper.

RUMANIA.
Scale: 1:1,000,000.
Size: 23 x 38 inches (19°30′ — 31° E, 43°30′ — 49° N).
A map for the study of Rumanian problems, including the Rumanian districts of Hungary.

RUSSIA.
Scale: 1:3,000,000.
Size: 39 x 51 inches (20° — 65° E, 37° — 60° N).
This map includes the whole of Russia in Europe and is of a size convenient for class use.

RUSSIAN EMPIRE.
Scale: 1:14,000,000.
Size: 14½ x 23½ inches.
This map covers the whole of the Russian Empire and shows the relief and railroads.

BALTIC BASIN.
Scale: 1:3,700,000.
Size: 21 x 22 inches (5° — 37° E, 53° — 71° N).
Covers the Scandinavian problem area.

BALTIC PROVINCES.
Scale: 1:1,000,000.
Size: 25 x 37 inches (20° — 30° E, 52° — 60°30′ N).
An excellent map for the detailed study of Livonia, Esthonia, Lithuania, etc.

POLAND AND LITHUANIA.
Scale: 1:4,000,000.
Size: 11½ x 15 inches (15° — 32° E, 47° — 60° N).
This small map includes Poland and the Baltic Provinces.

POLAND.
Scale: 1:1,000,000.
Size: 30 x 31 inches (15° — 26° E, 48° — 55° N).
This map covers the entire Polish area, including Prussian and Austrian Poland.

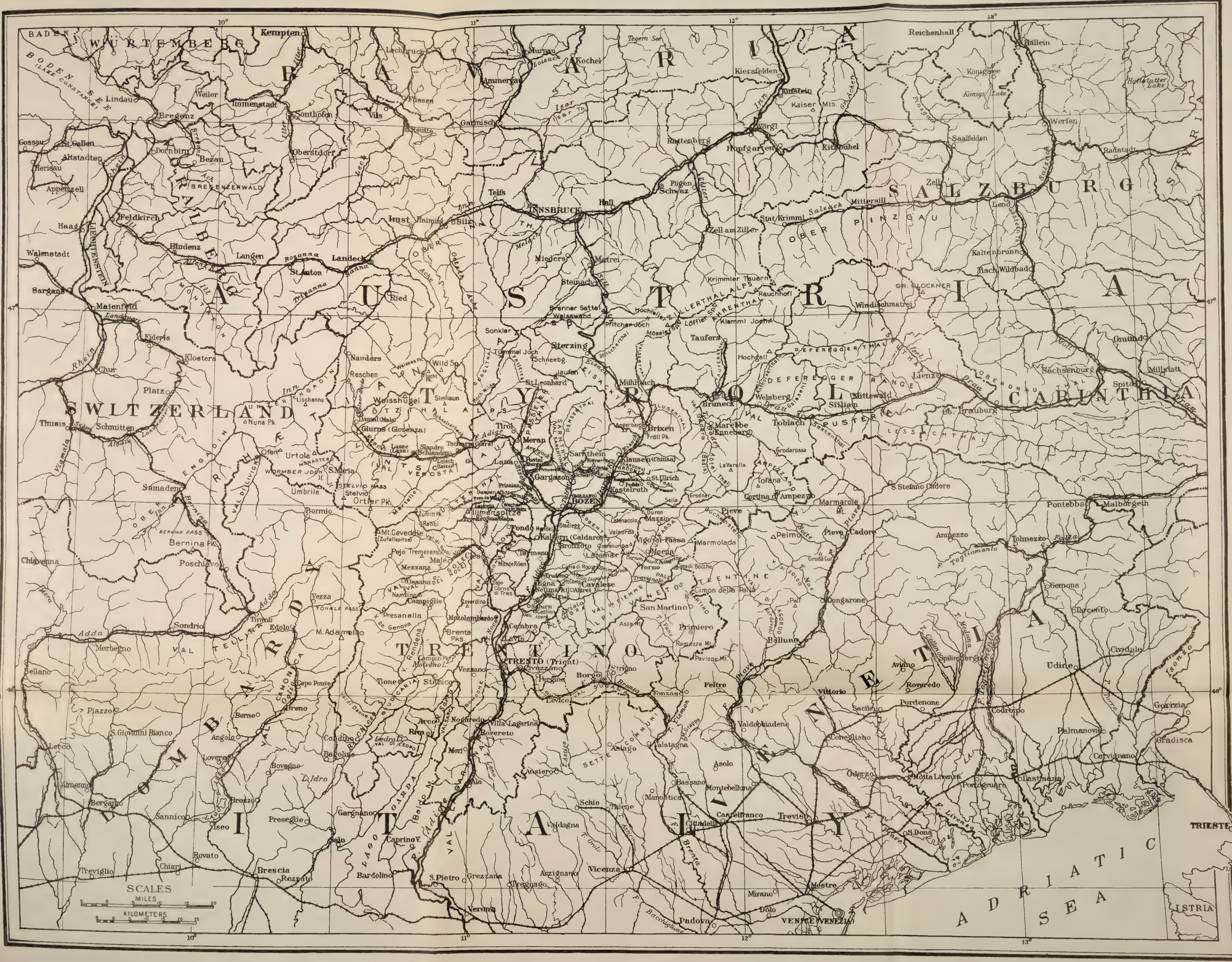
CAUCASUS.
Scale: 1:2,500,000.
Size: 16½ x 20 inches (36° — 50° E, 38° — 47° N).
Shows the governments, railroads, principal towns, etc.

CAUCASUS.
Scale: 1:1,000,000.
Size: 46 x 42 inches, in two sheets (37° — 50° E, 38° — 47° N).
A large map for the study of the zone of mixed populations between the Black and Caspian Seas.

TYROL

The American Geographical Society of New York

The Geographical Review, Vol. VII, No. 1, 1919, Pl. I



Scale 1 : 1,000,000

BLOCK DIAGRAMS OF EUROPEAN PROBLEM AREAS.

These block diagrams spread out the country before one as it might be seen from an airplane. They are indispensable accessories to a real understanding of many of the issues involved. The following can be furnished:

Albania—10 x 18 inches.

The Balkans—this large block diagram, in four sheets, covers the whole peninsula from Trieste to the Dardanelles.

Lorraine—in two sheets, 32 x 60 inches.

Trentino—27 x 31 inches.

Trieste—in two sheets, 36 x 54 inches. This diagram includes Istria and the Isonzo front.

ASIA.

Scale: 1:10,000,000.
Size: 35 x 44 inches, in two sheets.

The map covers the whole continent, and shows political divisions and principal railroads.

DANUBE TO INDIA.

Scale: 1:6,000,000.
Size: 20 x 33 inches (23° — 75° E, 22° — 47° N).

Includes Turkey, Persia, Afghanistan, the Caucasus, Egypt, parts of Arabia, India, etc.

WESTERN ASIA.

Scale: 1:9,000,000.
Size: 15 x 25 inches (25° — 80° E, 13° — 42° N).

Includes Turkey, Arabia, Egypt, Persia, Afghanistan, and parts of Russian and Chinese Turkestan and India.

ANATOLIA AND ARMENIA.

Scale: 1:2,000,000.
Size: 20 x 36 inches (26° — 47° E, 34° — 42° N).

Includes Turkey in Europe. Shows administrative divisions and railroads.

SYRIA.

Scale: 1:500,000.
Size: 34 x 46 inches, in two sheets (33°30′ — 39°30′ E, 33° — 37° N).

PALESTINE.

Scale: 1:500,000.
Size: 34 x 46 inches, in two sheets (33°30′ — 39°30′ E, 29°30′ — 33°15′ N).

These maps show the region in great detail and are so arranged that they can be pieced together to make one large map.

SIBERIA.

Scale: 1:5,000,000.
Size: 50 x 63, in two sheets.

Suitable for classroom use.

AFRICA.

Scale: 1:5,000,000.
In four sheets, as follows:
Northwest Africa—31½ x 35½ inches (28° W — 15° E, 5° — 39° N).
Northeast Africa—31 x 41 inches (9° E — 56° E, 5° — 39° N).
Central Africa—28 x 47 inches (2° — 54° E, 15° S — 14° N).
South Africa—24½ x 42 inches (8° — 58° E, 36° — 9° S).

These sections when pieced together make an excellent classroom map of Africa.

AFRICA.

Scale: 1:26,500,000.
Size: 11½ x 12½ inches (17° W — 53° E, 36° S — 39° N).

Small general outline map of the continent.

CENTRAL AFRICA.

Scale: 1:9,000,000.
Size: 15 x 25 inches (2° — 52° E, 15° S — 13° N).

Covers the Congo and Niger River systems, German East Africa, etc.

USE OF THE BASE MAPS BY THE PEACE COMMISSIONERS

By adding colored lines and similar symbols on these bases the peace commissioners, or others, may immediately have maps showing new state lines, ethnic boundaries, a rectified frontier, or a distribution of any sort, and at the signing of the treaty of peace a complete record of the new map of Europe.

A HISTORY OF THE INQUIRY TO BE PUBLISHED

The American Geographical Society will prepare, under the supervision of its Director, Dr. Isaiah Bowman, a complete history of the work of the Inquiry. A history of it will also be prepared for the History Board of the War Plans Division of the General Staff (War Department).

In addition to President Wilson, Secretary Lansing, and Colonel House there were a large number of distinguished visitors, including Secretary Houston, Governor McCall, and Major Requin, for a time General Foch's Chief of Staff. The last-named, at the time of his visit, constructed a blackboard sketch of the first battle of the Marne, and this, now carefully preserved, has great historical interest.

THE ENCHANTMENT OF THE OLD ORDER

By ALICE TISDALE

The Hum of a Chinese City

My wonder and delight in the age-old Chinese cities, where men still labor as their ancestors did thousands and thousands of years ago, will never cease. It is perhaps even greater now than when I first went to live in China and dwelt in a temple on a low hill just outside one of the largest of these cities. Sitting in the sunshine of the temple court, I felt the spell of that city grow within me. The city was such a quiet and gracious thing lying there below me in the valley. There was an absence of roar and clatter such as come from the canyons of the cities of the New World. Day after day I sat on the parapet surrounding the temple terrace, held there by the sound of the city below me. It was a mellow sound like the voices of many waters, a mingled human murmur, that drifted up to me through the still air.

Then, too, the aspect of that city in the soft autumn haze. There were no tall and ugly smokestacks breaking the curving lines of the gray-tiled roofs, no heavy columns of black smoke rising in masses and smudging the sky. In the early morning and at twilight, over each separate roof hung a thin gray veil of smoke—the gentle, vaporous smoke of the hearth fires alight for the morning or evening meal. As I watched those countless luminous gray veils suspended lightly over the housetops I began to think that the stolid little kitchen gods, which, I had heard, sat in a niche over each family's open brazier, had taken on life and now hovered lovingly each one over his owner's house, as living, guarding spirits; that at last all the countless prayers of countless multitudes to countless kitchen gods had availed and the gods now lived! So the heart of the searcher within me was at peace as from where I sat on the temple terrace I gazed and gazed upon this fascinating scene.

The Weird Power of the City's Sounds

By and by the call came that lured me down into the city. How tantalizingly mysterions were its sounds! There was still that mingling of voices, unbroken by the rumble of carts, for there was nothing but foot traffic in this southern city. As we drew nearer the voices began separating themselves into street cries and those unforgetable half-human, half-animal voices of the one-stringed violins and the pounding tom-toms. Now at last I heard the voices of primitive old-world tools, that never were loud enough to be heard up at the temple on the hill; there were strange singing sounds with a rough uneven rhythm; there was a strange clickity-clack with curious beginnings and abrupt endings; and there was the clang of hammers on metal. In that whole city there was no general indefinable buzz of machinery—each tool here had a sound all its own. In time I came to know the peculiar singing whir of the crude tool of the ginners of cotton, and the ticking, clicking of the handlooms, and the hollow pump, pump of the square bellows attached to the open braziers in the little street restaurants. But just now these sounds, coming and going, as I passed down the narrow, thronging streets tantalized me, appealed to me with their mystery. From overhead now came a whir and a whistling that made me tingle to my finger tips—tame pigeons flying with whistles on their tails. Even to this day when I hear them, the modern world slips from me like a superfluous garment. When I heard them then, I felt as free as the workers around me to believe in the dragon there in the fleecy white autumn cloud. For one moment I was not at all sure but that when we rebuilt our compound wall, which the last rains had overthrown, we should consult the native soothsayer as to the lucky spot for the gate. Such is the power of these Oriental sounds of crude tools, primitive musical instruments, and whirring, whistling pigeons.

Silk Farming

In some such mood as this I was once walking in springtime through one of the cities of central China. I passed out of the city to the mulberry-crowded countryside. This countryside had for me the fascination which the inaccessible always has for human beings; often as I had come there I had never yet, in springtime, been admitted to the dark farmhouses, for there was a superstition among the farmers that their silkworms would die if a stranger looked upon them. If an ordinary stranger could work such harm, what dire catastrophe might not a foreigner bring to the precious silk industry! So I had always had to content myself with walking along the flagged paths where the distorted mulberry branches looked like countless clenched fists raised to threaten me, and with imagining the busy life within those farmhouses where the silkworms were being so carefully tended. Indeed, so carefully tended were they that the women carried the tiny eggs in their bosoms until they were hatched. Then in some dark corner of the house they laid the young worms in trays and tended them day and night, feeding them and guarding them against cold and drafts; and when later the worms began to spin their cocoons they guarded them against interruption lest a moment's stop should mar the thread they were spinning.

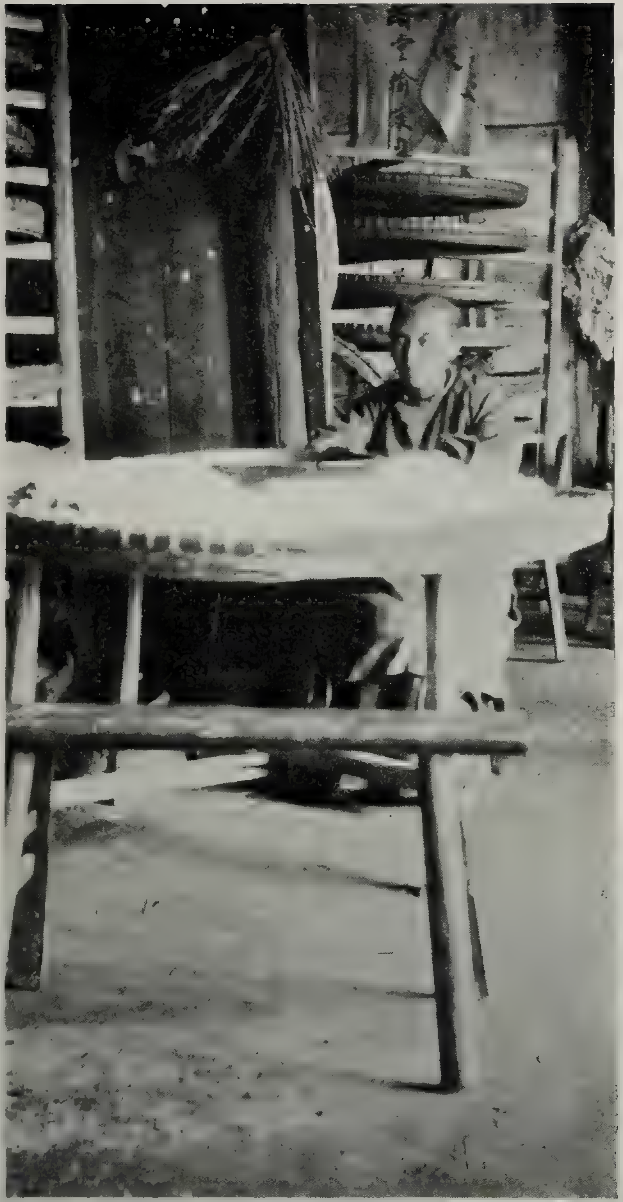
It was now a little later in the spring, and, as I walked among the mulberry trees and glanced wistfully at the open gateway of a well-to-do silk farmer, an old man sitting in the shade of the gateway asked me to come in and be seated. The silkworms had completed their spinning, he said, so

I could do no harm now. And so I gained admittance to the busy life of the silk farmer that lay behind that quiet gateway. The whole of that patriarchal family except the old grandfather, who for some reason was exempt, were busy with the cocoons. In this atmosphere where young and old labored together in the sunny court, I thought with regret of our apartment-house families whom machinery has deprived of such companionship.

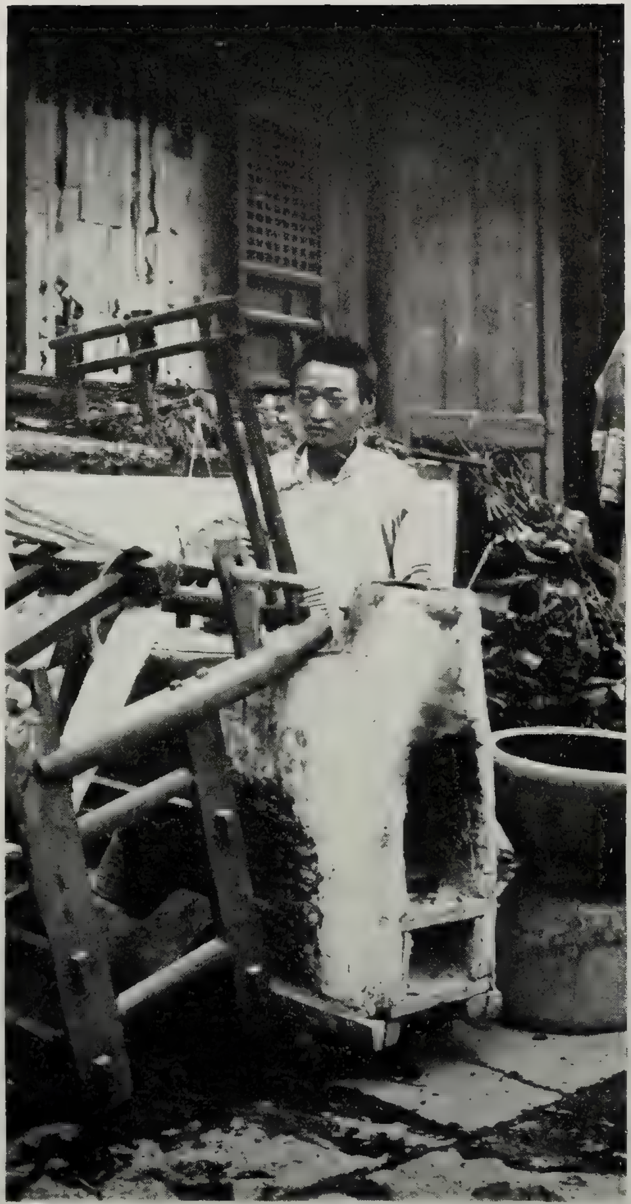
A Family at Work among the Cocoons

In the room with the ancestral tablets the grandmother was quietly sorting the cocoons on huge wicker trays. Sitting a little apart, she looked as if old age claimed that distinction. In the side buildings, with their fronts all open to the sun, the main business went on. In these buildings stood great cauldrons of boiling water, and children fed the clay stoves beneath them or hurried back and forth bringing the trays full of the sorted cocoons. The men and women of the great patriarchal family sat by the steaming cauldrons deftly handling the cocoons, now dropping them into the boiling water, now starting to unwind the filament from the cocoon on to the octagonal reels, which were ever turned round and round by some simple contrivance worked with their feet. It seemed as if they would feed forever those hungry reels which begged for more and more. It was a picture of industry and sunlight: a flood of sunlight in the court; great patches of sunlight on the hard-packed dirt floors of the many rooms; sunlight in the rising steam from the boiling cauldrons. The piles of white cocoons grew smaller and smaller, and the heavy tan-colored bands on the reels grew thicker and thicker. The silk

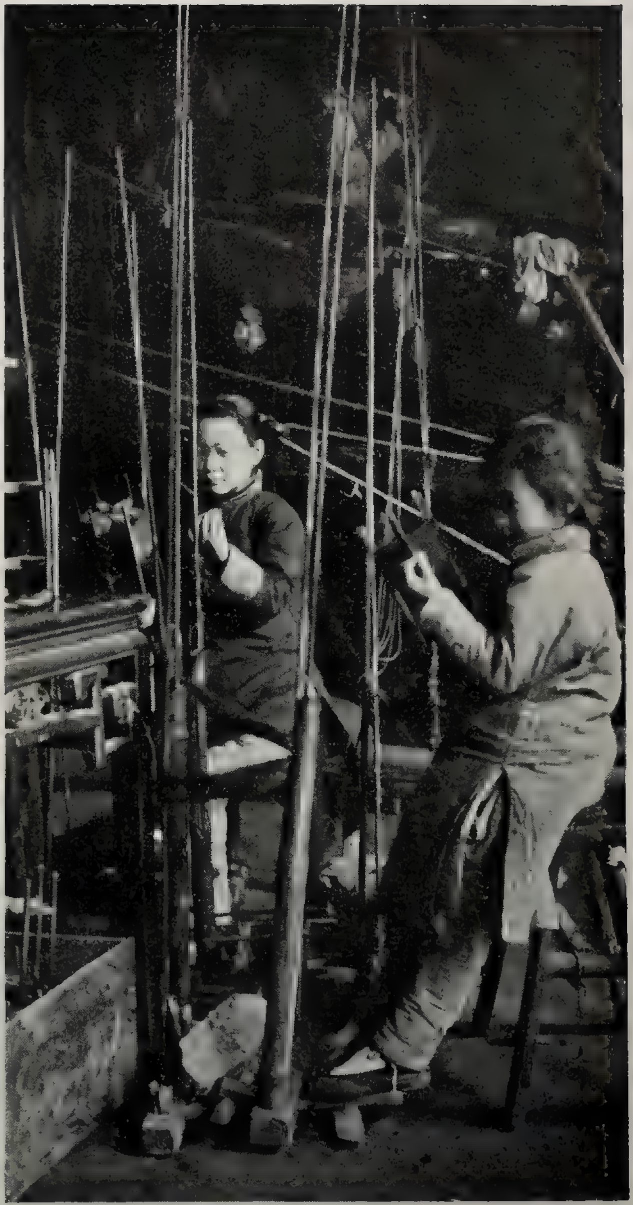
"The mulberry-crowded countryside."



'The grandmother was quietly sorting the cocoons."



"Men and women . . . . sat by the steaming caul-
drons deftly handling the cocoons."



"Then down to the lips of the spinner, where it
passed lightly through to her finger and thumb."

was good this year; the gods had indeed been kind; and every one of that group of home workers was contented and happy.

Often after that I came upon such scenes of family industry. I began following the children whom I met carrying skeins of silk down the narrow streets. Like the traditional fairy in green who seduced people with his bright color, these children who would scuttle down some narrow way with their frames of bright red or orange or blue enticed me from my ordinary pursuits. Their colors were irresistible. It was a good deal like following a rainbow, and often quite as futile, for suddenly those children would vanish and seldom could I for the life of me tell where they went. But sometimes I was more lucky and caught my rainbow. Then I found my way into the homes of the silk weavers.

The Spinners

For some reason the weaver and his ways have always been entrancing mysteries to the rest of mankind. Did not Silas Marner's neighbors look upon him with a mixture of superstitious fear and unbounded curiosity? Only when this industry is removed to the great factory does the mystery cease. I am no exception to the rule; although a fleeting glimpse of the children with their bright skeins bewitched me, a thousand times more was I bewitched when I gazed into the dim interiors of the weavers' homes. These interiors, full of deep shadows and soft high lights, resembled nothing so much as a Rembrandt canvas come to life. Girls and women in dull blue trousers and coats sat in the half shadows spinning. They sat before crude contrivances of four bamboo poles on which bright bands of silk were placed, much as we hold a skein of yarn for someone to wind into a ball. In their hands they held square distaffs. Up across the dim rafters over their heads went the silk thread from the brilliant band, then down to the lips of the spinner, where it passed lightly through to her finger and thumb; after that, transformed into a fine even thread, it wound itself around that square distaff that she twirled round and round with her other hand—with her feet she worked a wooden treadle that moved the band of unspun silk on the four bamboo poles. Tirelessly on and on moved those twirling distaffs.

The Weavers

The men of the family were the weavers. At the sides of the room stood the cumbersome looms with the dirt floor dug into a pit for the feet of these primitive machines. On a wooden bench, with his feet in this pit working the treadles of the loom, sat the weaver throwing his shuttle across a warp of beautiful colors. Behind him glowed his fantastic paper windows; and high above him, very near the dim rafters over which passed the silk threads of the spinners, sat his more clever brother or more experienced father pulling mysterious cords and threads which set the pattern for him. That maker of the pattern, sitting up there near the rafters as if in the rigging of a ship, seemed to be playing some strange musical instrument built of numerous pipes infinitely thinner than the pipes of any organ. The strange keyboard below—the warp of the weaver—responded not with music but with color. As he pulled his cord pipes, up would come or down would go numberless silk threads of the weaver's warp. Thus at this strange musician's bidding did satins and silks of many colors, with quaint and occult symbols, grow under the hand of the weaver.

"The heavy tan-colored bands on the reels grew thicker and thicker."

Presiding over it all are the scrolls and tablets of the ancestors. And as this is no machine-run world, often the man in the rigging comes down and the weaver takes his feet from the pit and the women and girls leave their spinning to drink from a cracked old blue teapot that always stands on a table in some dark corner. Such are the old-world silk weavers as they exist in China to-day.

Color, Color Everywhere

In these cities of the silk industry of China it is not only the dark interiors that have charm and color; neither need one be content with the fleeting glimpses of color from children scuttling down narrow alleys or streets with their brilliant skeins. Even he who runs may see the magic beauty of the Oriental tints, for over the canals and over the streets stretch long horizontal poles from which float yards and yards of woven silk straight from the dyeing vats. If you take a house boat in the early spring and work your way down any city canal, there above you can be seen floating the silk—pale lavender, delicate blue, and curious other shades lacking ordinary names. The stone drains leading from the dyeing vats are stained with these same strange hues. Along the canals and streets gateways standing a little ajar will give you glimpses of sunny courts where, before many-spoked reels, sit old grandmothers and little girls winding gay cotton threads onto bobbins; big girls and strong young women stand near combing the variegated cotton warp. There are courts full of big yellow mushrooms (oil-paper umbrellas drying in the sun), other courts where the basket weavers work, and open shops where brass and copper kettles are being hammered into shape. Everywhere in these cities of the old order is color and much peace and no haste.

"Sat the weaver throwing his shuttle."

"The strange musician played his cord pipes."

The Charm of Autumn

In this nation of hand labor every season and every district has its special charm for him who loves simple toil. If spring is entrancing in these cities of the weaving industry, everywhere in China autumn holds one spell-bound. The balm of autumn weather, the mellow sunshine which is like a gracious after-thought of summer for the purpose of giving mankind time to garner in her plenty before the winter descends, take on a special significance in this country where everyone down to the smallest child has his share in the autumn harvest. Always have I loved that air of preparation for the winter wherever I have encountered it. As a child I loved the pungent smell of the pickling and the bustle attendant upon canning. This is all that is left in American households of the old order when each family harvested and threshed and dried its own winter stores. But here in China one does not have to content himself with such a limited touch of the autumn preparation; in all the countryside and every village and city, men, women, and children share in this great moment, and everything is done simply and in accordance with the ways of nature.

Threshing Rice

In the South as you *yao lu* along the country canals or follow the stone-flagged paths, you may see the country people threshing their rice without a scrap of machinery. They simply beat the heavy heads of the grain against fan-shaped boxes that stand in the fields where the rice lies garnered into bundles. In the courtyard of every thatched farmhouse stands the simple winnowing apparatus—nothing but a small box on four legs with a chute at the top and a chute at the bottom and a wooden crank that turns the wooden fans within. Into the top of this crude contrivance the men pour streams of brown rice kernels. Someone else in the family turns the crank. That is all there is to it; the chaff flies upwards, and the heavy kernels of rice settle down into the little wooden pocket at the bottom and then stream out through the chute into a wide-mouthed wicker basket. The whir of the moving fans and the patter of the falling grain sound like rain on a roof—a part of nature herself.

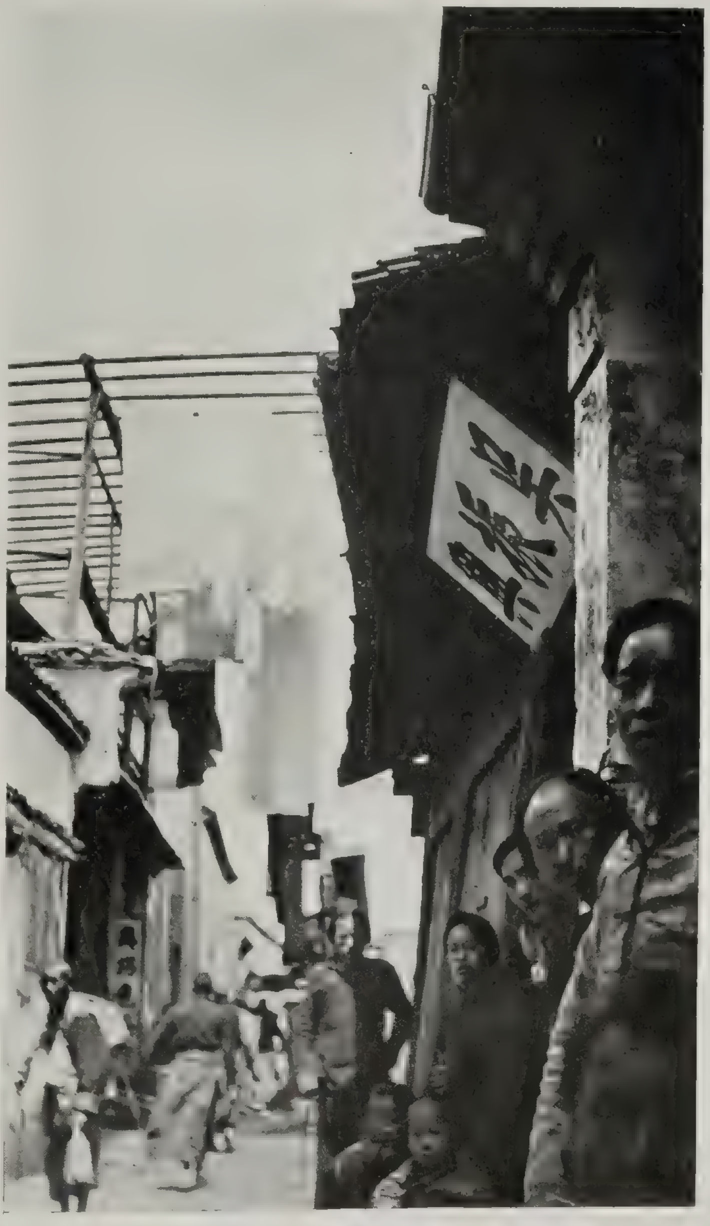
Husking

But this is only half the scene. Over by the door another son pours these brown kernels into a hollow cuplike opening in the upper millstone, with his other hand turning the stone by a wooden crank and husking the rice between the upper and nether millstones. After that the newly husked kernels are placed on huge flat trays, and another muscular half-clad son of the family tosses the rice high in the air until the last bit of chaff is blown away. In this same way for hundreds and hundreds of years has one generation after another prepared their winter stores of rice. Just as nature keeps her ways from year to year, so do these patriarchal families keep their ways from one generation to another. Well sweeps of the same pattern as those of ancient Egypt still lift water into the fields, and millstones of the old fashion still grind in the courtyards.

HARVESTING THE "KAOLIANG"

Perhaps the most perfect autumn idyl is found in the North, where it is announced by the beautiful brown heads of the *kaoliang*, or millet, seen against a sky as blue as that of Italy.

We speak of the bosom of the earth, and here in the North in the autumn those words take on reality, and earth seems indeed a tranquil, gracious mother. Here these simple sons of toil appear to respect her gracious gifts, for they do not rush in and tear them ruthlessly and hastily away; nobody snatches the grain from the earth by high-power machinery. A peasant passes along the winding country paths with a bundle of grain across his shoulder; oxen plod along even more slowly than the slow-moving peasant, pulling carts with wheels of the oldest fashion known to the world. The carts are full of *kaoliang*, and the long cornlike leaves and the rich brown heads often touch the ground and leave a trail of brown kernels. It is all so still—just the crunch of the heavily studded cart wheels and the brush of the grain on the ground.

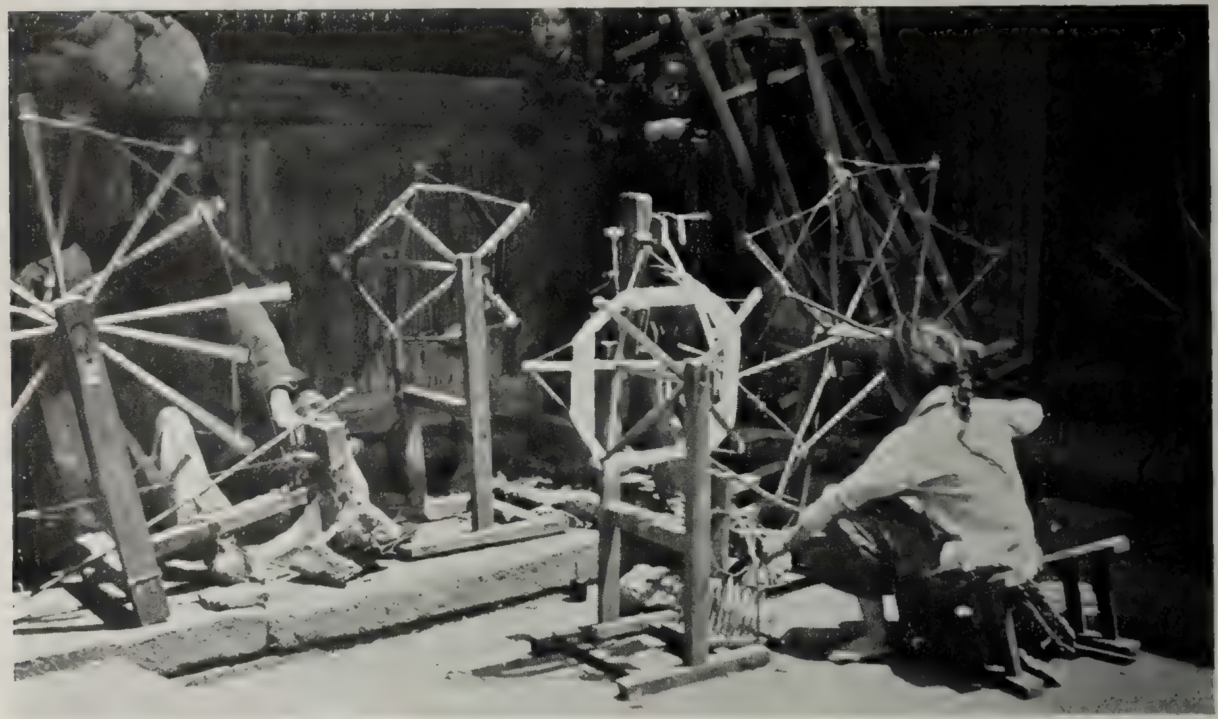


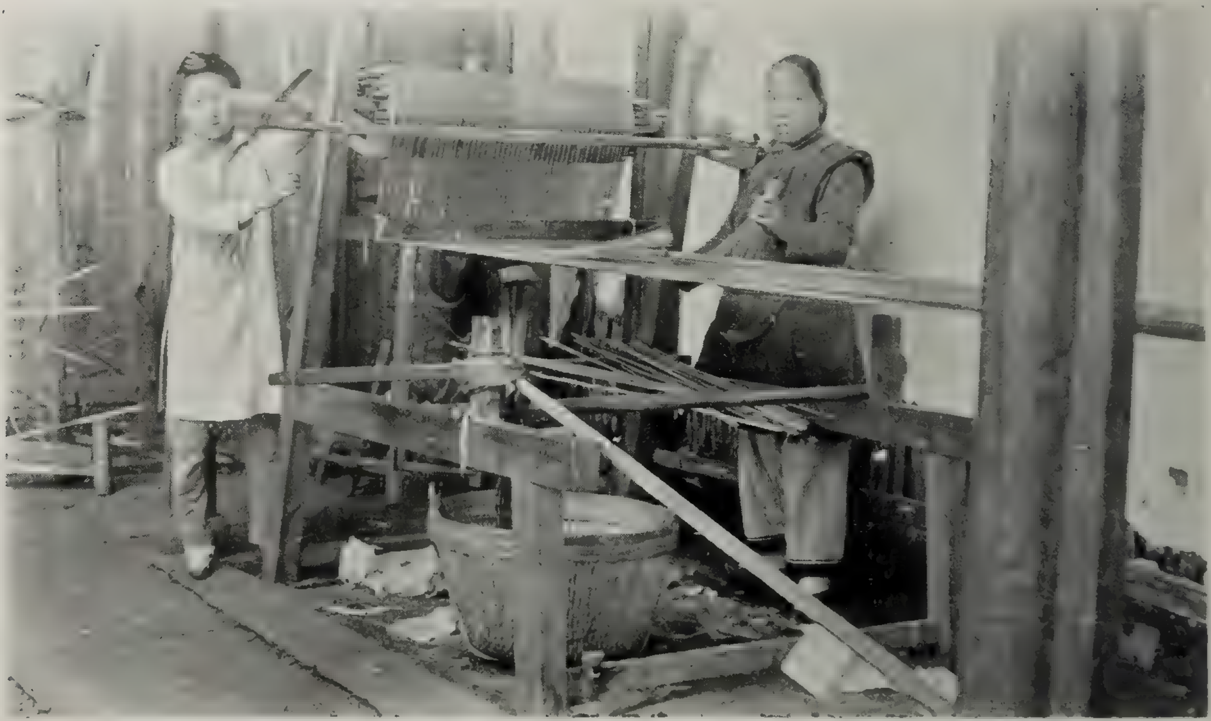
"Float yards and yards of woven silk."

The courtyards of the farmhouses are now silent one and all. In the quiet streets offerings of incense smoke before the shrines; in the courtyards red peppers hang drying by the doorways. On the threshing floors and on the thatched roofs lie heaps of yellow corn. In some sunny spot bask the house dogs and a little gray donkey; but the families are all in the fields sharing in the work of the harvest.

THRESHING THE GRAIN

In a few weeks life returns to those quiet courtyards. The hard-packed threshing floors are now covered with the red-brown *kaoliang*. With flails patterned after those of generations ago the farmers beat out their grain. The flail consists of a long handle at one end of which, at right angles, is attached a short wooden axle around which a stout board revolves. The brown backs of the workers glisten as the flails are swung over them and then down on the grain. The play of muscle beneath the brown skin is a splendid sight. In one corner of the court are the millstones, and now the donkey, which a few weeks ago drowsed his days away, is one of the busiest





"Sit old grandmothers and little girls winding gay cotton threads onto bobbins."

"Strong young women stand near combing the variegated cotton warp."

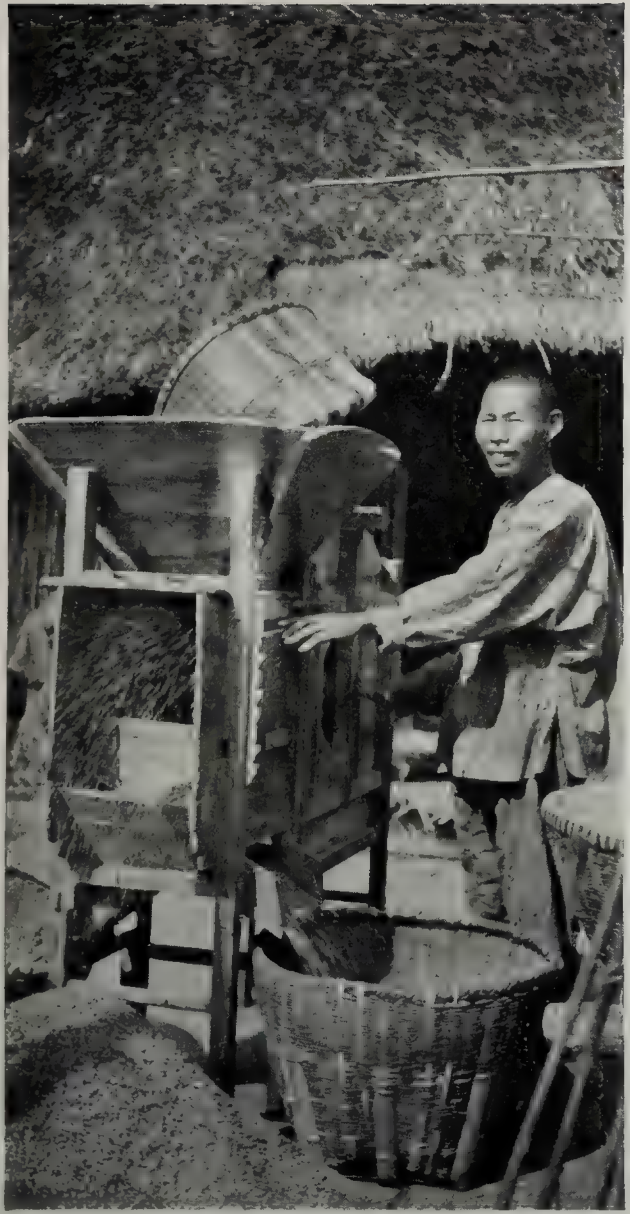
members of the household. Round and round he walks and turns the millstone, and, as the crushed grain oozes out, the women sweep it into great wicker trays and toss it in the air, deftly separating the coarse from the fine.

The Old Order and the New

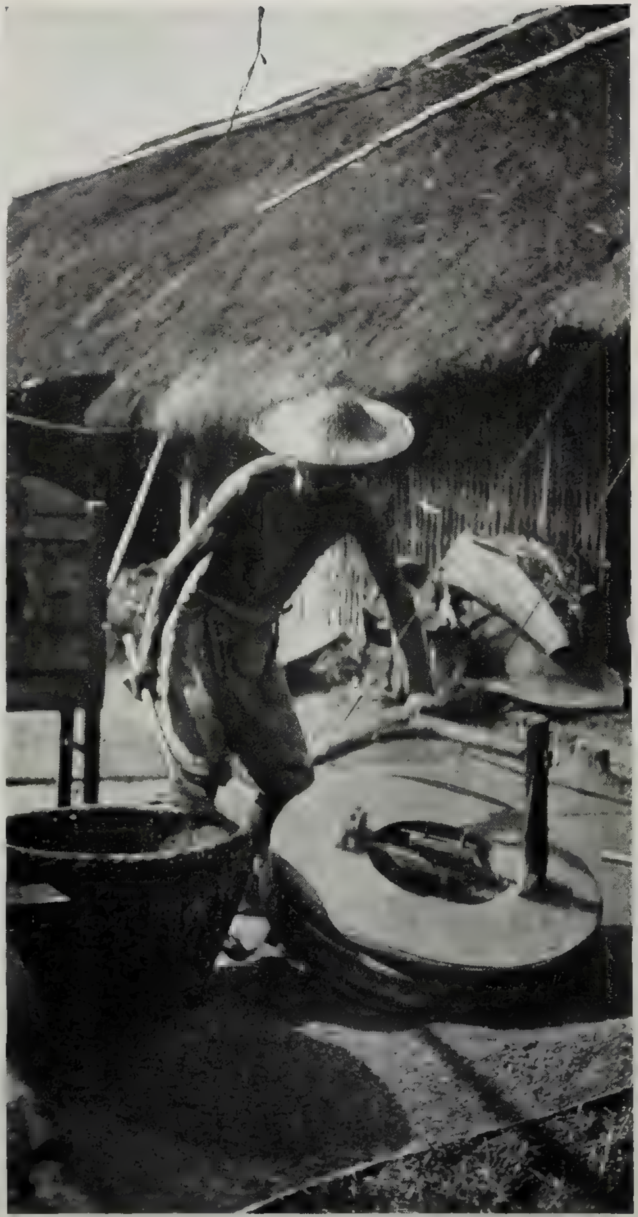
Let him who is weary of the machinery of the Western world come and stand in the doorways of these courts and watch this simple toil with its color and freedom. Let him watch the glistening brown backs of the men, the flying flails, the women in their gay garments of blue and red, and the gleam of the sun on the grain as the women with beautifully free movements throw it into the air and catch it again in the trays. One forgets the modern world and the struggles for material gain and luxury. One's wants are reduced to the needs of life, and a blessed sense of peace settles over one like a soft and all-enveloping cloak. Once life was as simple as this for all the world. May some small corners of it long remain under the old order of things to give quiet and peace to the new!

Threshing rice.

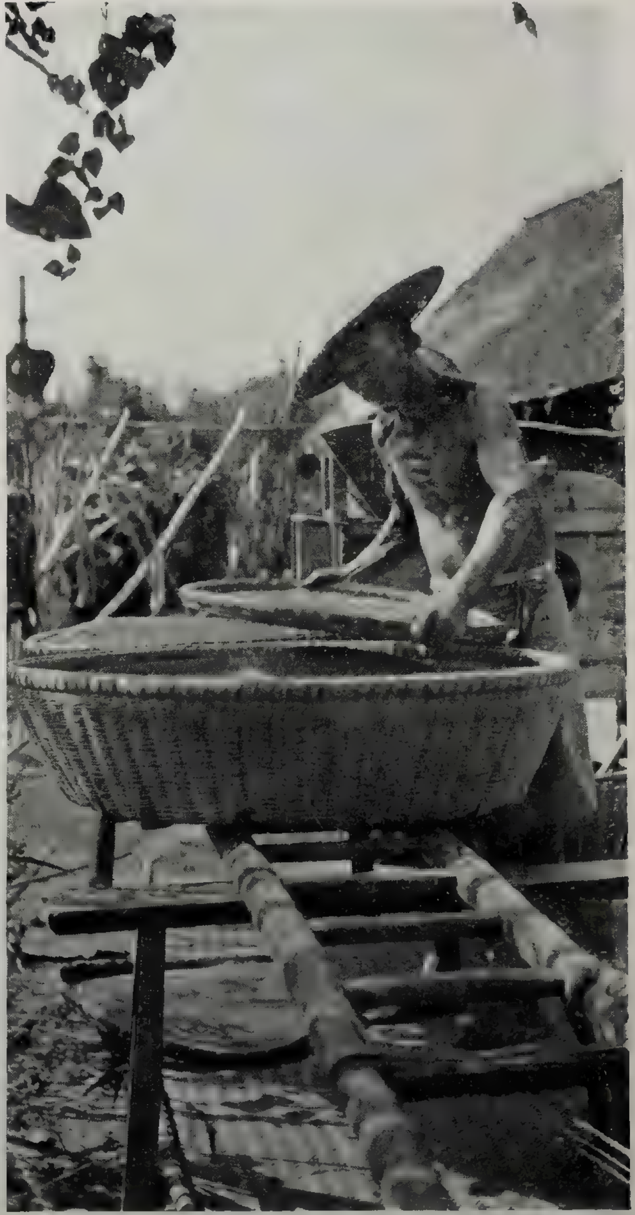
But whatever one may wish, the old order is passing. I sit writing in my house on a hill with just such a countryside on the hills and in the valleys to the south and a city of the hand laborer in the valley to the north where men still make heavily studded cart wheels with their fixed axles, where in all the grain shops the donkeys walk round and round the mill-



"The simple winnowing apparatus."



"Turning the stone by a wooden crank and husking



"Another muscular half-clad son of the family tosses stones, where the shoe shops sell stiff handmade moccasins, where the old square bellows still blow the fires in the dark little street restaurants, and where in the outskirts huge wicker wine bottles lined with oiled paper lie drying in the sun. But in the midst of all this there may be heard a sound repeating itself monotonously, insistently, quite distinct from the old familiar music of voices drifting up to me from the valley. It is a new sound in this part of the world: there is no break in it as there is in the sounds of the old-fashioned hand-workers' labor; this new sound is persistent and regular. It reminds one of a huge clock ticking. Its monotonous tick, tick seems to announce the inevitable approach of some dreaded event. The approaching event it announces is the new order. The great clock is the first piece of machinery in the city, steam-driven machinery to run the many looms in a new cotton mill.

THE FUTURE OF PALESTINE

By ELLSWORTH HUNTINGTON

Political Future

The future of Palestine is one of the world's important problems for two chief reasons. The first is the position of the country in respect to India and the British Empire; the second is its historic interest as the Holy Land of Judaism, Christianity, and Mohammedanism.

Importance of Palestine as a Link in the Route to India

To realize the importance of the position of Palestine take a map of Eurasia (Fig. 1). Remember that India is the key to the British Empire. Without that country Britain would still be great, and the self-governing dominions would still be loyal, but the *Empire* would be broken. The Russians have known this ever since the spurious will of Peter the Great urged the people of the North to expand across southwestern Asia and cut off England. The Germans knew it, and if they could have fastened their grip on Turkey and Persia, or even on Siberia and Russian Turkestan, their next step would have been to strike at India across Afghanistan. The British knew it, and the aim of their most far-seeing statesmen has always been to obtain control of the quickest possible route to India in addition to the longer, slower sea route.

The shortest and quickest route from Britain to India, provided the proper railway lines were built, lies via the Germanic regions of Central Europe to the Balkans and Constantinople; thence, via the Bagdad Railway, to the Persian Gulf; and then through Persia and along the coast of the Indian Ocean to the mouth of the Indus River. That route can never be England's main reliance because of the presence of Germany and Austria in the heart of Europe.

The next quickest route runs via the Baltic Sea to Russia, thence by rail to Baku and its oil wells, and across the Caspian Sea to Transcaspia. There the Russian railroad now ends, at the northwestern corner of Afghanistan, but the distance to the new line from India to Seistan and eastern Persia is only about 300 miles and is rapidly being lessened. This Russian route is quick and easy, but, like the one through Central Europe, it passes through foreign territory, so that England cannot rely on it in times of stress. Thus if England would have a pathway to India all her own, she must still traverse the Mediterranean Sea, as she has done ever since the Suez Canal was built. But is England going to be satisfied with the water route to India? Is it best for the world that she should be so satisfied? Perhaps, but the answer to these questions depends largely on who rules Palestine. It is one thing to have a feeble power like Turkey with its blunt weapons sitting beside the main highway of the British Empire. It is quite another to have in that place some great power which may at any time whip out a sharp knife and cut that vital highway. It would be suicidal for England to let any but its closest friends assume power so close to the line on which the life of the British Empire depends.

The Real Bridge between Egypt and Mesopotamia

There is another reason why Palestine is of supreme importance to England. In these days of readjustment the British Empire seems to be taking another of those inevitable steps which have caused the country most capable of colonial administration to have the greatest colonial empire. It is for the good of all concerned that this last step should be consummated. Look at the map once more. In the days when sailing vessels went around the Cape of Good Hope, English merchants established themselves first at Bombay and then, about in 1740, at Calcutta near the mouth of the sacred and dirty Ganges. There the British Empire really began. The merchants were seeking pounds, shillings, and pence. They found war, fame, and empire. In spite of themselves they were forced either to retire or to rule. They chose to rule, for they were men of energy and strength. Little by little during three centuries their rule expanded. Eastward it spread only to Burma, for the Burmese mountains blocked the way. Northward the Himalayas interposed a still greater barrier. Hence the British advanced westward. There was no definite plan for such growth at first. Like the Roman and American empires, the British Empire expanded because when strong meet weak, the strong are bound to dominate. That is why we took Texas, California, Hawaii, the Philippines, and Panama. That is why England overran not only India, but Baluchistan, and then peacefully penetrated Persia, and has now conquered Mesopotamia. Because of this same inevitable law of nature England peacefully fell heir to Egypt, while recently in the midst of bloody battles she has been the power that logically invaded Palestine. No matter what may be the final terms of peace in other respects, England is almost certain to retain her hold on Mesopotamia. In British hands Mesopotamia is almost sure to become another Egypt, a fertile home for the overcrowded population of India. When the Tigris and Euphrates are well harnessed, and when the wandering Arabs and the poor Persians and the hosts of India begin to pour into the newly irrigated lands, there will soon be a population of several millions busily raising dates, cotton, and many other products.

When that day comes—and it is not far away—we shall see the nearest possible approach to the old conditions when Egypt and Mesopotamia contained the two world powers. Those two rich river valleys will not be powerful, but they will be prosperous, populous, and able to buy and sell. Inevitably there will be much communication between them. Hence

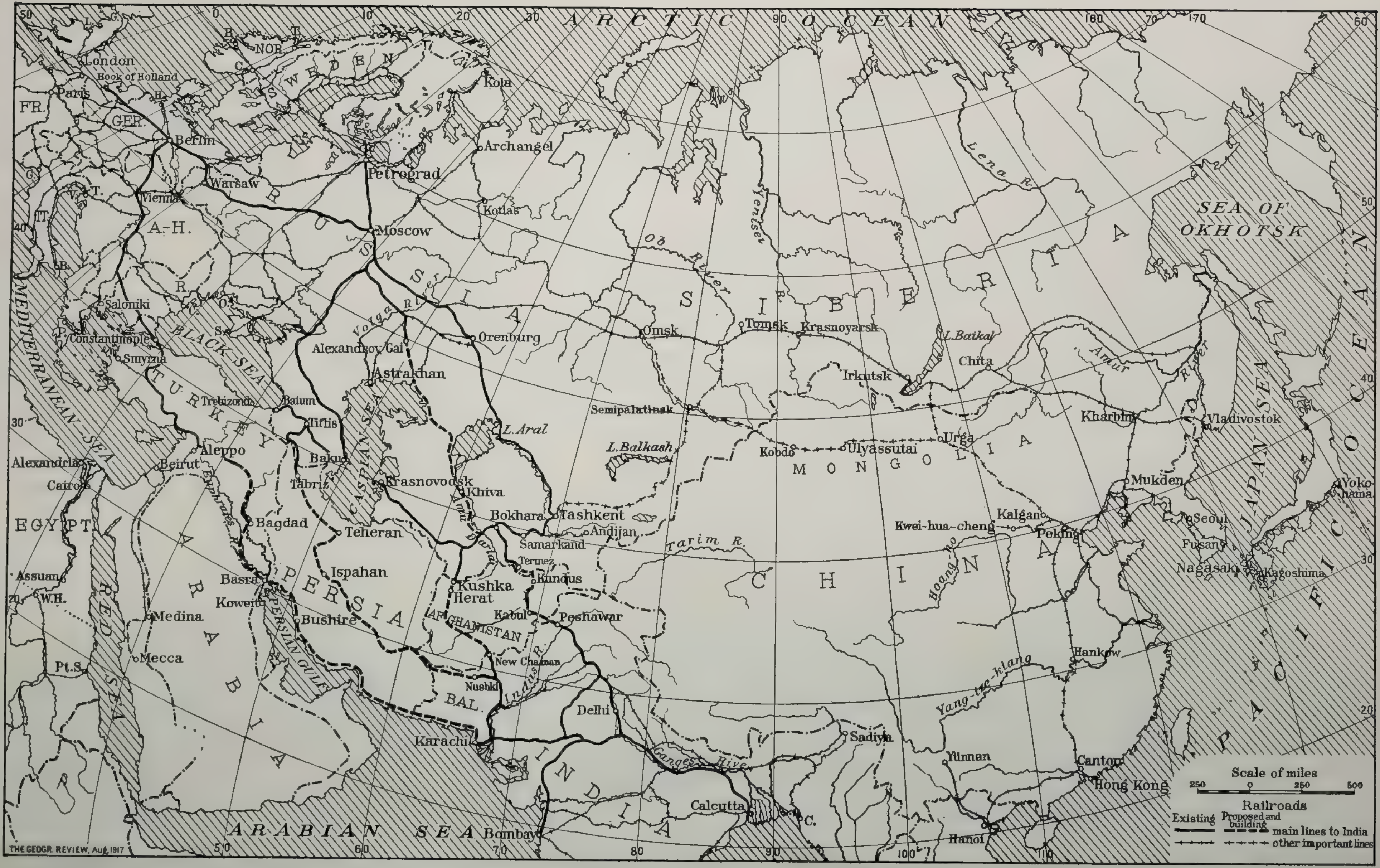


FIG. 1—Sketch map of Eurasia showing the position of Palestine in relation to the routes between Western Europe and India. Scale, 1:57,000,000. (Reprinted from the August, 1917, *Geogr. Rev.*)

there must be an easy land route as well as a sea route from the Mediterranean to India. The land route may start from almost any point on the east coast of the Mediterranean, and it will certainly have important feeders from Alexandretta in the northeast corner of the Mediterranean and Beirut in the middle of the east coast. Yet its main terminal must be Egypt, where the British power is most firmly grounded.

Palestine the Key to the Land Route to India

Between Mesopotamia and Egypt lies Palestine. That is why the Bible is full of the wars of the Egyptians, Assyrians, and Babylonians. That is why the Hebrew patriarchs traversed Palestine between the time when Abraham left Ur of the Chaldees in Mesopotamia and the day when Joseph went down into Egypt and was followed by his brethren. On the map, to be sure, it looks as if the route from Egypt to Mesopotamia might run straight east from Suez through the oasis of Jof to Koweit at the head of the Persian Gulf. Why cannot England be content to build a railroad there, and thus link up the two parts of her empire without disturbing Palestine and the Syrian regions farther north? Such a railroad *might* be built, but there is not one chance in a thousand that it ever will be. In the days of the Roman Empire, to be sure, a caravan route ran this way, starting at the famous rock city of Petra at the southern limit of Palestine, but that was when southwestern Asia enjoyed a more abundant rainfall than at present. Today the entire thousand miles from the Suez Canal straight eastward to the head of the Persian Gulf is almost unmitigated desert which even the Arabs rarely cross. Jof, the only oasis, is nothing but a group of wells. If a railroad were built here it would probably be the most unprofitable road ever constructed. Aside from Jof it would pass through not a city, not a town, not a real village, and not even a good field or orchard for a distance as great as from Boston to St. Louis.

Route for a Railroad

The only feasible route for a railroad between Egypt and the eastern parts of the British Empire is what we call the Nile-Jordan-Euphrates route. From the Suez Canal this follows the coastal plain as far as Mount Carmel in Palestine. There it turns inland along the plain of Esdraelon, crosses the Jordan just south of the Sea of Galilee, and proceeds northward across the plains of Hauran to Damascus. Thence the route coincides with the present Mecca railroad as far north as Aleppo, where it joins the Bagdad railway, which will ultimately follow the Tigris from Mosul and ancient Nineveh to Bagdad and the Persian Gulf. Before many years, however, another railroad will probably be built northeastward across the desert from Damascus. It will pass through the stately ruins of Palmyra in the desert and farther east go down the Euphrates to Basra, the river port for ocean steam ships. Such a road would be only about 300 miles longer than the direct route across the main desert through Jof. It would be commercially profitable, for it would run most of the way through territory that is already populated, or that is capable of supporting a considerable population as soon as it is irrigated. Such a railroad with its continuation in southern Persia would unite the British Empire much more firmly than any other method that seems within the bounds of possibility. It is desirable for every reason. Not only must England have it for the sake of her Empire, but the regions through which it will pass need it to establish the *pax Britannica* after their long nightmare at the hands of Arab, Turk, and Persian.

If such a railroad is to become a reality, and if the British sea route to India is to be safe from a flank attack, Great Britain must have control of Palestine and of the part of Syria east of the Anti-Lebanon and including Damascus.

French Claims

Will the other nations consent to such an arrangement? France is traditionally the guardian of the Christians of the East. For many years she has exercised a sort of protectorate over Syria. Today she apparently expects that this protectorate will be enlarged and confirmed. Her expectations are justifiable. Nevertheless it would be well for the world if she would relinquish whatever claim she has to Palestine and the part of Syria east of the mountains. In return Britain may well make large concessions in other regions. Divided authority, however, is always bad, and it would be well for all concerned if one great power could have a free hand in Syria, and also in the Armenian regions whence flow the waters that will redeem Mesopotamia. Britain is logically the country to control this region. Already she has Mesopotamia, and it will greatly hamper the progress of the whole Turkish Empire if she cannot control the highlands to the north and east and the approaches from the west.

American Attitude

As to our own attitude toward the future of Palestine, the wisest course seems to be to support Great Britain as far as possible, but also to urge that France be fully compensated elsewhere. Perhaps the difficulty of harmonizing conflicting interests may lead to some sort of joint control in which the United States may have a share. Possibly a semi-independent Zionist state will be organized under the guarantee of a League of Nations, with England, France, and the United States as chief sponsors. England might well consent to such an arrangement if the railroad were left in her control and there were no possibility that Palestine would become a military base for some other power. Whatever may be the final solution we must take our share of responsibility for seeing that it is fair to all concerned. Our philanthropists, our educators, and our missionaries have done far more for Syria and other parts of the Turkish Empire than have the people of any other nation. We have done our best to inspire them with the love of freedom and with aspirations for progress. We cannot leave them in the lurch until we know that they are safely under the guardianship of some wise, strong power like Great Britain.

Importance of the Caliphate

There is another reason why England should have control of Palestine and the neighboring regions, especially Arabia. It is well known that a Holy War, that is a war of Moslems against Christians, is always a possibility in the East. The Caliph, or head of the Moslem world, has a strong influence with Moslems in all countries. Formerly the Sultan of Turkey was the supreme Caliph. During the Great War, however, many Moslems thought that he had become the vassal of the Kaiser and was no longer to be obeyed. This idea, which was rightly fostered by the Allies, led to a rebellion on the part of the Sherif of Mecca, who claimed to be Caliph even while Turkish garrisons still held out in Medina and another small town. Odd as it may seem, these garrisons appear to have lived for a year or two on friendly terms with the people with whom they were supposed to be fighting. If the Moslem world is to be kept contented it appears necessary that there should be a Caliph whose authority is widely accepted. England rules far more Moslems than any other country. Therefore she is the natural protector of the Caliph. If she had Palestine, this, with Egypt, southern Arabia, and the Persian Gulf, would round out her Moslem possessions in this region, would enable her to encircle him and at the same time leave the Caliph a small semi-independent territory including Mecca and Medina, the two holy cities of the Moslems. England has had long experience in dealing with vassals of this sort. For the peace and happiness of the world it seems eminently wise that there should be no further chance for some irresponsible and uncontrolled potentate like the Sultan to have the power and prestige that undeniably go with the Caliphate.

Economic and Social Future

So much for the political future of Palestine. What of her economic and social future? Let us consider the possibilities of this little land which is so familiar in name but so unfamiliar in real essence. Can it ever again become a land flowing with milk and honey? Suppose that it is turned over to the Zionists, will its own citizens ever be able to maintain a strong, progressive government able to support itself and improve its people through its own initiative? These questions need careful handling lest we fall into the rosy errors of the enthusiasts on one side and the black despondency of the pessimists on the other. There is no denying that Palestine is greatly handicapped both by its physical conditions and by the quality of its present inhabitants. Yet the case is by no means hopeless. Egypt is a most encouraging example of what can be done when a strong and benevolent European government undertakes to improve a forlorn country of the Orient. Palestine can never attain the agricultural wealth of Egypt, but in other ways it can far surpass that country.

Natural Resources

Let us examine the resources and possibilities of Palestine. So far as natural wealth is concerned the Holy Land is decidedly poor. It has no minerals, forests, or fisheries worth mentioning. It has a little water power in the Jordan River between the lakes of Huleh and Galilee, but there is not the slightest reason to believe that manufacturing can ever become an industry of much importance. Neither can there be any great development of commerce, for there is not a single good harbor on the whole coast. Much commerce may pass through the country when the Nile-Euphrates railway is completed, but this will have little effect on Palestine. Does this sound discouraging? It is not so bad as it sounds. Almost the same might be said of many of our greatest states such as Nebraska. Agriculture is the world's great resource, and many a region such as Nebraska is prosperous simply because it has fine agricultural possibilities and energetic people.

The Soil

In Palestine agriculture once reached a high level. It does so today in spots. It might do so in many more spots. The soil is almost everywhere highly fertile, for it is largely the residue formed by the decay of limestone, or of dark, rich lavas. Few sights are more inspiring than the wonderful, level wheat fields in the basaltic soil of the Hauran east of the Sea of Galilee, or the orange groves of the Jewish colonies around Jaffa. Unfortunately the soil is very thin in many regions, especially in the highlands of Judea and Galilee, where the climate is most bracing. Formerly this was not the case. In the days of Jesus Christ and earlier there is reason to think that all except the steeper slopes were well clothed with rich soil. It has disappeared because of the change of climate which is now generally agreed to have taken place. A diminution of rainfall, especially during certain especially dry times such as the seventh century of our era, apparently made agriculture difficult. This led to the neglect of ordinary farming and to increased reliance on sheep. At the same time the constantly recurring droughts seem to have killed the trees and bushes and to have diminished the number of smaller plants. Thus during the long rainless summers the feet of the sheep and goats, as they tramped over the hillsides, broke up the soil and made it loose. When the rains came in the fall, they washed away the soil in great quantities, leaving thousands upon thousands of acres of bare rock. Many a landscape in

Judea is half bare rock. Here and there, to be sure, lie pockets of fine soil, but at present most of them are unused.

Rainfall and Temperature

Aside from the scarcity of soil the chief handicap of agriculture in Palestine is the lack of rain in summer. From October or November to April or May there is usually plenty of rain—as much as in the eastern United States. The rest of the year there is practically none. Hence the peasants must either raise crops such as winter wheat and barley that are ready to reap by June or July and drought-resistant trees like the olive, or else they must practice irrigation. On the plains of Sharon and Esdraelon and in the Jordan Valley irrigation is possible and will doubtless be developed on a considerable scale under the new régime after the war. It is also locally possible in a great many places where small cisterns and reservoirs can be constructed. Nevertheless it can scarcely be the main reliance of the country. The places where it is possible are too limited in area. Moreover the places where it is possible on a large scale are low, hot, and unhealthy. In the Jordan Valley the noon temperature averages 100° F. for six months in the year and over 75° F. the cooler six months. On the plains near the seacoast one swelters day after day in summer and loses all one's energy. One of the few regrets of my four months in Palestine is that the July heat made me so lazy that I gave up climbing Mount Carmel, a trip that I had planned for months. If I had climbed I know that I should have felt much more energetic, for the highlands are far better than the lowlands. Of course they are hot in summer and when the south wind blows from the desert people simply wilt away. Yet much of the time the summer heat is not trying, and the winters are quite bracing. Unfortunately, however, the places that are best for man are just the ones where the soil is thinnest and the possibilities of irrigation least.

Dry Years

In spite of these difficulties Palestine might derive much profit from agriculture if only there were some provision to tide over the dry years. Such dry years come at irregular intervals and are the great bane of the peasants. In 1909 I saw thousands of acres of wheat and barley into which the sheep and camels had been turned for pasture because there was nothing to reap. In other years those same fields yield wonderful crops. In the same way the olive crop is often very fine, but some years it fails. Many of the rockiest hillsides as well as thousands upon thousands of acres elsewhere might profitably be planted with olive trees. In this way the whole aspect of the country might be changed. There is no possibility of increasing the rainfall by this means as some people have supposed, but what water there is would be prevented from draining away so fast, and the soil would have more chance to accumulate.

Possibilities of Government Aid

One of the great needs of agriculture in Palestine is a strong and benevolent government. Under the Turkish régime there was a tax on each olive tree. When the tree yielded a poor crop for a year or two, the thriftless peasants often cut them down in order to avoid paying the tax. Under the new régime the government must encourage the planting of trees. Not only should it remit the taxes in years of drought, but it should make some provision for compulsory insurance. Part of the yield of oil might be stored and then sold in bad years for the benefit of the peasants. There is always a good market for olive oil. The great necessity is some means whereby the good years can be made to feed the bad. The same is true in respect to grain. Simply because the climatic extremes are far greater in a subtropical land like Palestine than in a land of storms at all seasons such as the eastern United States there is far more need of paternalism on the part of the government. If the wonderfully rich soil of Palestine is to be utilized in the years of good rainfall, some kind of state insurance is needed to tide over the bad years. Also there is great need of some provision for work on public improvements or otherwise during the dry years when the average farmer in Palestine sits around and does nothing most of the time. England has taken important steps toward solving this problem in India, but it is far easier of solution in Palestine.

Tourist Travel

One reason why the agricultural problem is relatively easy of solution in Palestine is that this is the Holy Land. Not only religiously, but economically the Bible is a great asset. When Palestine is finally under the enlightened rule of one of the great powers, the tide of tourists and pilgrims will increase enormously. In fact it seems highly probable that a considerable proportion of the inhabitants will be engaged in one way or another in caring for the wants of the travelers. This, however, can never be a substitute for agriculture. There are today about half a million people in Palestine, and there will doubtless be many more before long. Ordinarily only a small part of these will be needed to take care of tourists. In Switzerland I believe that only five per cent of the population take care of the sightseers. Nevertheless the agricultural deficiencies in Palestine can be greatly alleviated by a judicious handling of the tourist problem. In bad years a wise government could easily lower the prices of board, transportation, guides and the like. Private companies might even find this profitable, since they would be able to hire men and horses at lower rates than usual. By judicious use of advertising and by varying the rates of transportation from other countries there is no doubt that the government and the companies together could cause the tide of tourists and pilgrims to ebb and flow so that many of the people of Palestine would find employment in years of poor crops, while relatively few would be so occupied when all hands were needed to harvest the heavy crops of wheat and barley that often gladden the eye on the hills of the Holy Land. Such a plan is indeed paternalistic, but paternalism seems to be necessary in dealing with backward countries.

Need of Good Roads

If agriculture and tourist travel are to succeed in Palestine one of the first necessities is a widespread improvement of the roads. Today one can almost count the good wagon roads on one's fingers. One road winds along the crest of the plateau northward from Hebron through Jerusalem and Nablus, or ancient Samaria, to Nazareth and the north. Another leads from Jaffa up to Jerusalem, and a third along the coastal plain from Jaffa northward. Usually, however, the roads are merely trails. In the villages the man who picks up a stone in his vineyard often throws it into the street—if street is the right word for a mass of small, loose, limestone boulders. Elsewhere the trails are execrable. In eight years of travel I have never traversed any trails worse than two leading down into the Jordan Valley. On one occasion one of my horses slipped on the stones and fell eight or ten feet, landing on his back. The other time a baggage horse, utterly weary from a long steep descent, slipped on the rocks, and became so tightly wedged between two boulders that we could scarcely get him out even when his load was taken off. Even in the settled parts the trails are usually so bad that wheeled vehicles are out of the question. In many places the poor little donkeys stumble and fall so badly that it scarcely pays to load them, and one sees the people carrying home their grain and straw on their own heads. Of course conditions are better in the plains, but even there good roads are almost unknown.

Such roads, or rather such lack of roads, inevitably retard civilization. When the crops are plentiful it is extremely difficult to take them to market and sell them at a profit. When the crops are poor, it is equally expensive to bring food from a distance. Thus poverty is engendered, and poverty means ignorance and ill health. Moreover, there is no doubt that travel is one of the best means of enlightenment, but no one wants to travel over such roads. Many people have never been beyond their own little market town. In the Jordan Valley I met an Arab sheikh who said he had never been to Jerusalem, although it was only 16 miles away and he had often seen it. In the future one of the great advances in Palestine is almost sure to come through the building of roads. If easy roads and good mountain trails are everywhere available, travelers from foreign lands will visit hundreds of out-of-the-way places which now are rarely seen.

Scenic Attractions

From my own experience I can say that in all my travels I have never seen any region of equal size which rivals Palestine in variety of scenery and unique interest. Not only are there holy places to be visited, Bible scenes to be recalled with wonderful interest and distinctness, and a new type of life to be seen, but there is most striking scenery. Go along the east coast of the Dead Sea from one end of the lake to the other, and you see something that probably cannot be paralleled elsewhere. The red cliffs with wild palms growing on their tops, the weird hot springs, the narrow cleft where the Arnon breaks through the wild crags, the strange banded platforms of the Lisan—all these and many other scenes make the voyage down the Dead Sea one of the most striking events in the career of any traveler. Or to go to Petra and wander among the white cliffs and caves, the red temples and gorges, and the banded red, yellow, blue and gray pinnacles of the ''high places'' on the mountain tops. If something quieter is desired, visit Jerash with its Roman ruins and its picturesque Circassians, and pass on to the oaks of Gilead, where one must dodge the branches or die like Absalom, and where the people still live in caves. Good roads and trails will indeed spoil these places for the people who love adventure, but they will make them accessible to thousands who now stay away because of the hardships.

Physical and Mental Inertia

Good government, an assured system of agriculture, and good roads will by no means make Palestine a paradise. Hard work and poverty will still be the lot of the majority of the people. Schools and other kinds of instruction will do much, new immigration may add a more progressive element. Yet still there will remain in Palestine the half million backward people who are now there, and their almost equally backward children. But will their children be so backward? The answer is found in places like Egypt. The children are not quite so backward as their fathers, but the change is slow. I do not know whether the present natives of Palestine have good minds or bad. I do know that something aside from bad government is responsible for their backwardness. Of course the Turkish government has done its best to make Palestine a desert. Yet even the government can scarcely be held responsible for the man who for years bends down to take hold of a plough handle only a foot above the ground. He might easily splice a new piece of wood onto the old one, but he is too inert. If this man were alone, he might not matter, but his action is typical of thousands, or perhaps hundreds of thousands.

We cannot yet say with certainty that it is ill health that causes such seeming stupidity. Yet there are strong grounds to think that this is the case. In our own country we are fast discovering that an appalling amount of seeming stupidity is due to anaemia or other minor ailments. A child who is deaf or near-sighted is called stupid; one whose feet are wrongly shaped is called a coward because he does not like to play ball. In Germany, even before the war, over 20 per cent of the school children suffered from anaemia due to malnutrition, poor teeth, and various other causes. In a country like Palestine most of the people must be suffering more or less in this way. Of course we have no figures; we can merely judge by the way in which the parents sit with open mouths while the children stand around doing nothing instead of playing. Part of the trouble comes from the lack of variety in the climate. While the winters are fairly good, there is altogether too little variability from day to day. Hence people lack the stimulus which comes from constant change. Part of the trouble is due to insufficient food, which is the common lot of a large part of the population for years at a time. Also the food is too uniform. Bread and a little cheese day after day is all that many get. Another part, however, and probably a large part, is due to mild but protracted diseases which almost escape notice.

We might go on to amplify the lack of physical vigor, and hence the lack of mental achievement. How much these have to do with the backwardness of the present people of Palestine and of Turkey as a whole we cannot tell. Certainly this matter of physical vigor is so important that it should receive the first attention of any power that wishes to raise Palestine to its former high plane. That plane, it will be remembered, was apparently attained when the climate was more variable and when the general food supply was less precarious than now. If the Zionists make an earnest attempt to rehabilitate Palestine, they can do the world no greater service than to determine exactly what it is which makes the people of countries like Palestine so anaemic and inert. If these qualities can be overcome, we may expect Palestine to advance rapidly. If they cannot, the best that can be done is to furnish a good government, improve the roads, prevent famine, and raise the people as high as is possible for people who lack energy.

GEOGRAPHY IN AMERICA

By WALLACE W. ATWOOD
Harvard University

The time has arrived when there should be a great awakening in the teaching of geography in America, and that teaching must go far beyond what most grown people remember as geography. This nation has enjoyed a long period of remarkable internal development. The population has increased from 1,000,000, at the time of the American Revolution, to nearly 100,000,000. The people have spread slowly from the Atlantic to the Pacific. Thousands have poured in from the overcrowded countries of Europe. Much of the land in the United States has passed into private ownership. Railways have been built, telephone and telegraph lines erected, until, as a great network, they bind the different parts of the nation together.

The best harbors have led to the establishment and growth of great sea ports. The immense supplies of fuel and water power in the northeastern section have hastened industrial development. The rich soils with adequate rainfall in the south and in the Mississippi Valley have favored the development of wonderfully prosperous agricultural districts. The drier plains farther west have been found suitable for grazing and certain types of farming, while the high western mountains are storehouses of great mineral wealth.

America's Growth from Isolation to Expansion

But the period of isolation has ended. Industries have been established and plans for manufacture developed on so large a scale that our merchants are seeking new markets for their products. They are also seeking new sources of raw material, so that they may continue to expand and promote those enterprises.

This nation has entered upon a period of maritime expansion. Thousands of new American vessels will be available soon, and a remarkable commercial development is certainly coming. The business men must have representatives in distant parts of the world. More young men will be sent to other countries. They should be specially trained in economic and commercial geography.

The great world war has forced us to take a prominent part in the politics of the world. Young men will be called upon more and more to go into government service in foreign lands. As officials they should be well posted upon conditions in all parts of this country before they attempt to represent us. They must deal fairly and intelligently with other peoples. To do that they must know the conditions under which those people live, their resources, and their economic and commercial possibilities. They must know the needs and the ambitions of the people with whom they deal.

Value of Geography in the War

A broad study of the geography of the world with the emphasis on human geography is fundamental to an understanding of living conditions in any land. The study must be pursued as a science so that knowledge of the physical features, the climate, and natural resources may be definite and exact. Men must understand the influence of these great geographic factors upon human affairs.

The reading of maps will play a more and more important part in the study of geography. Every officer in the American Army is trained to make and to read maps. All enlisted men receive some training in map making and map interpretation. Every campaign on the Western Front was worked out on maps, and special maps were prepared for the men to follow in each battle. More than 100,000 young men, members of the Students' Army Training Corps in the colleges and universities, were required to pursue courses of instruction in map making or map reading. Every discussion of the causes of the war calls for a knowledge of geography. Writers on the diplomatic background, on the history which has led up to the war, on the possible changes which may follow it, rely upon a knowledge of geography for many of their conclusions.

The closing of the Dardanelles by the Germans in 1914 did more than any other single act to weaken the Russian army and lead to its collapse. The route from the Black Sea to the Mediterranean is the one exit from the rich productive area of European Russia which is free from ice throughout the year. Nine-tenths of the imports and exports of that great agricultural land passed through the Sea of Marmara. When that route was closed most of the commerce of Russia was stopped. War supplies, and especially munitions, could not be imported. The situation became worse and worse, and assisted in bringing on the great collapse.

The coal, iron, lead, and zinc of the Rhine Province have been of first importance to German industrial life and have made it possible for her to continue the war. Without Lorraine industrial Germany would be powerless unless she could get iron from some other country.

The leading French geographers were attached to the Service Géographique de l'Armée, serving the fighting forces. New maps were prepared almost daily. At the battle front airplane pictures served as a basis for mapping enemy territory. An enemy trench dug during the night was photographed from the air, the next morning placed accurately upon a map, the map reproduced, and the revised edition was in the hands of the commanding officer by noon of that day.

The British Army has a force known as the Geographical Section of the General Staff. This force has prepared, among many other maps, a special relief model of the Western Front.

Topographic features in the battle line played a most important rôle. The great east-facing escarpments in the Paris Basin served as natural defenses against the enemy. Hundreds of thousands of men were sacrificed by the Central Powers in their attempts to storm the escarpment east of Verdun. The topographic position of the Chemin des Dames line and of Laon gave them their military significance.

The fact that there is but one main route to follow in crossing the Ardennes, the narrow canyon of the Meuse, made the situation for large armies that were forced to retreat in that direction very critical.

The American Army has now commissioned a number of trained geographers. They are on duty in the Military Intelligence Branch. Individual geographers and geographical societies are serving the government. The National Shipping Board has trained geographers on its staff. In their work a knowledge of the economic and commercial geography of the world is indispensable. The call from the government for trained geographers has gone beyond the present supply.

The entire public is being trained to read maps. Almost every edition of the newspapers contains some form of map. Magazine articles never contained more maps than at present, and publishing houses are issuing special maps for homes, schools, and offices.

Climatology in the War

Every change in wind direction at the battle fronts was watched most carefully. Gentle breezes were first utilized by the Germans to carry deadly gases over the trenches of the Allies. Later the Germans may have somewhat regretted the introduction of that type of warfare, for most of the gentle breezes suitable for carrying gases come from the west and blow into their own territory.

Every one of the great campaigns on the Western Front was timed with regard to the general climatic conditions. The movement of a cyclone, or low-pressure area, over the fields of battle usually brings unfavorable conditions for a great attack. Rains may cause rivers to be flooded, roadbeds to turn to mud, and the movement of heavy guns to be delayed. The approach of a high-pressure area, or anti-cyclone, usually means a few days of fair weather with clear skies. The weather changes on the Italian front have been of most notable significance. When the heavy winter snows came, the Austro-German advance through the mountains was absolutely stopped. With each great melting of snows and with each heavy rainfall in the Alps, the streams in the lowlands of the Po are flooded and become serious barriers to an advancing army. Every student well trained in modern geography should understand the climates of the world and the common weather changes and have some ability to forecast weather.

Data Needed for Peace Conference

The members of the peace conference will demand a vast amount of geographical data. They should be experts on the geography of Europe.

The distribution and amount of natural resources, the nature and possibilities at certain seaports, the political boundary lines, the distribution of nationalities, the rivers, canals, and all highways of travel in and about Europe are of prime importance in the equitable solution of national problems and the adjustment of conditions so that each people may promote industry and commerce to the best advantage. We look forward to an improvement in living conditions throughout the world.

Need for the Extension of Geographic Study

There never was a time when so many of the people in the world were really interested, perhaps unconsciously, in geography; but the organization of geographic information and of plans for the improvement and extension of the teaching of geography in America calls for a definite program. Geography should be taught in every high school, every normal school, every college, every university. There is a phase of geography, as well as a part of history, or a branch of mathematics, or a language study, that is appropriate for each stage in the training of students. The science of geography deals with many of the fundamental controlling factors in the activities of people. If we wish to know the peoples of the world, we must know the geography of the world.

It has been a great mistake in American educational work that the study of geography for most people stopped at the close of the seventh or eighth grade. That has meant that few people have studied geography since they were eleven or twelve years old. Some have gone on into the high school, the normal school, or the college only to discover in their higher education that they needed a knowledge of geography which they did not have. There was no opportunity for them to pursue that work. Normal schools have given more attention to the teaching of geography than any other institutions above the grammar schools, but there the emphasis has been laid on how to teach geography. Their task has been to train teachers to go into the elementary and grammar schools to teach the elements of geography.

If we stop the teaching of geography at the close of the seventh or eighth grade, we stop that study before the child is sufficiently mature to understand the technical phases of the subject and before he is sufficiently mature to appreciate many of the larger problems of geographic influences upon life. We stop before we can expect to have the fruits of geographical instruction in our educational system. We stop short of getting from the study of geography what the nation and educators might well demand of it.

Geography in the Colleges

Furthermore, this system has meant that those who have gone into the elementary and grammar schools to teach geography knew little, if any, more than they had learned while they were in those schools themselves. The condition is quite different in the case of history or mathematics or language studies. In those great fields of educational work there have been opportunities for advanced study in high school and college. Geography has been sadly neglected by the colleges and universities in America. There are, indeed, a few of the higher institutions where some attention has been given to geography, especially in the last few years. The results of their work are just beginning to be felt.

In some of the colleges the work offered has been in the technical branches of physiography and meteorology. The more human phases of geography should be added. Climatology should be emphasized; economic and commercial geography taught; regional geography, the influence of geography upon history, and anthropogeography should be developed as college courses of instruction. Research work in each of those lines should be encouraged. Map making should be developed in this country. We should not be compelled to use foreign atlases for the best maps.

Geography in Foreign Universities

In France each of the universities has a large department of geography. At the University of Paris there is a staff of eight specialists giving their full attention to this field of study. The great English universities are similarly equipped, and so are the German universities. Dr. Chisholm in a recent article[1] states that in 1917 the University of Liverpool established a professorship in geography and that a new chair of geography and anthropology has been founded at the University College of Wales, Aberystwith. The president of the Royal Geographical Society in an address last May commended the examples set by the Universities of Oxford and Cambridge in proposing that geography be included in the subjects for a degree in honors. Dr. Chisholm further states: "At Edinburgh University a degree of Bachelor of Commerce has just been established, and in the studies for this degree geography is made obligatory at one stage and is among the optional subjects at a more advanced stage." Similar progress has been made in Austria, Switzerland, Italy, Denmark, and the Netherlands. Those foreign nations have appreciated before we have the necessity of advanced and research work in geography, of opportunities for those who go into commercial life, into diplomatic service, or into teaching, to be well trained in geography.

Need of Trained Teachers

In the education of children the problem is to select wisely from a vast amount of knowledge and information that which is most suitable for the training of the children at each particular stage. The teacher should be a master of the field which he or she intends to draw upon for information in the organization of a course of study. When that teacher enters the classroom her thought, or his thought, should not be given entirely to the subject matter to be used. The teacher's thought should be on the development of the children. That demands a well-trained teacher, it demands a broadly trained teacher, and it demands that the teacher know more about the subject matter than he or she is expected to teach.

---

[1] G. G. Chisholm: Geography in British Universities, *Journ. of Geogr.*, Vol. 17, 1918, No. 2, p. 77.

The case is perfectly clear that we have neglected geography in America. The teachers in that field appreciate the fact. They hope to arouse a greater interest in the teaching of the subject, and they deserve recognition, they deserve encouragement. Thy are organized as a National Council of Geography Teachers, hoping to waken a greater public interest in geography, to indicate to the higher institutions of learning that more geography should be taught, and to encourage educational administrative officers to assist in promoting and improving the teaching of geography in our common schools.

When 2,000,000, and possibly more, Americans return from very active life in Europe, their interest in foreign lands will be exceedingly keen. Each one of them will spread that interest to a circle of friends, and a strong demand will come from that source for more and better teaching of geography to the next generation.

All the universities and all the colleges in America should open departments of geography as fast as adequately trained instructors can be furnished. Those that now have departments of geography should expand those departments, should man and equip them so that American universities may have departments of geography as good as those in any other country in the world. Those universities that have made a start, that have departments of geography now established, should be taxed to the utmost in the training of instructors to fill the demand from the colleges and universities where the subject is yet unrecognized in their curricula. There are plenty of young people who would take up this field of work as a profession if American colleges and universities recognized it by positions in their faculties.

A Wider Knowledge Needed

All young people in America should be thoroughly trained in the geography of their own country. This must be more than bounding states, naming capitals, or simply reciting facts about the earth. They must understand how geographic factors control life. Each generation of young people in this country should have an opportunity to know the geography of the world. They should be trained in the interpretation of geographic facts, trained to understand how geography has influenced history, how geographic factors almost always determine the economic and commercial activities of a people. The time has come, when we, as a people, should understand, as never before, that we must *know the geography of the world.*

We have been awakened to an appreciation of the great wealth of natural resources in this country. The formation of the mineral deposits has taken thousands, perhaps millions, of years; most of our soils are millions of years old; all of the coal, all of the natural oils and gases are millions of years old. Forests are slow in growth. Some persons realize the necessity of wise conservation, but it becomes increasingly important that each new generation appreciate the significance of conserving our natural resources so that the industrial and commercial life of the nation may continue.

Our young men and women should know the great outstanding facts of geography which have influenced the expansion of civilization from the earliest days of Grecian culture. The famous explorers who have assisted in mapping out the lands and the seas came chiefly from Western Europe. That part of the world became somewhat crowded by the close of the fourteenth century. Its merchants wanted the products of distant lands, and they had goods to send in exchange. Little by little, through the last four hundred years of geographical explorations, we have come to know almost all the lands on the earth. A few islands may yet be discovered, and other portions of Antarctica may be explored. There are a few densely forested areas and a few desert lands that have not as yet been visited by white men, but we have a command of the essential facts regarding the habitable portions of the earth.

The great routes of emigration have been from Western Europe into each new land as it was discovered. The Americas have been and are being rapidly developed. They are the lands of political independence where the great republics of the world have been developed. In South America there are but three small countries, British, Dutch, and French Guiana, that are not independent. Africa was the last continent to be appropriated. Fifty years ago our geographies showed most of that land as unexplored. Today there are boats above the falls in the great rivers, railroads have been built, and most of that continent has been divided among the European nations. There are now but two small independent nations in Africa.

Asia is the land where most of the people of the world live, a land of ancient civilizations where old customs have persisted and where Europeans and Americans have not until recently been very welcome. About the middle of the last century Japan adopted the ways of the Western world and since then has taken a conspicuous part in the commerce and politics of the world. China is now undergoing a rapid transformation from a closed to an open country. During the twentieth century the Chinese people, numbering about 400,000,000, will certainly develop their great natural resources. They will become an industrial nation, and that will lead them promptly to a world commerce.

Ships on the Indian and Atlantic Oceans have already become so numerous that definite routes must be assigned to certain lines of steamships to reduce the chances of collision. Today commerce in the Pacific is increasing at an extraordinary rate.

THE PROBLEM OF LIVING AT PEACE WITH THE WORLD

Most of the world has been explored, and most of its habitable lands have been appropriated by the several nations. The great problem confronting us today is how all peoples may live in peace. What economic and commercial relations can be fairly established? Each people should have the opportunity to develop its own natural resources, to produce in abundance what it can best produce, and to trade freely with other peoples. We have learned as citizens of the several states to live together, and each year we endeavor to improve, in some peaceful way, the political and economic conditions in this country. We now have with other nations of the world the larger problem of establishing and maintaining equitable relations between all peoples of the earth. Every aspect of our military, industrial, commercial, political, and educational life reflects the importance of an awakening in the teaching of geography.

RAINY DAYS AND RAIN PROBABILITY IN THE UNITED STATES*

By ROBERT DeC. WARD
Harvard University

Number of Rainy Days

In some climates the total annual precipitation falls on comparatively few days, the rest of the year being rainless. In others, where the annual rainfall is smaller, the rains are well distributed, falling on many days throughout the year. Climates of the latter type may be much more favorable for crops than the former. The number of rainy days is thus often a more critical factor in the growth of vegetation and in many of man's outdoor activities than the annual amount of precipitation.

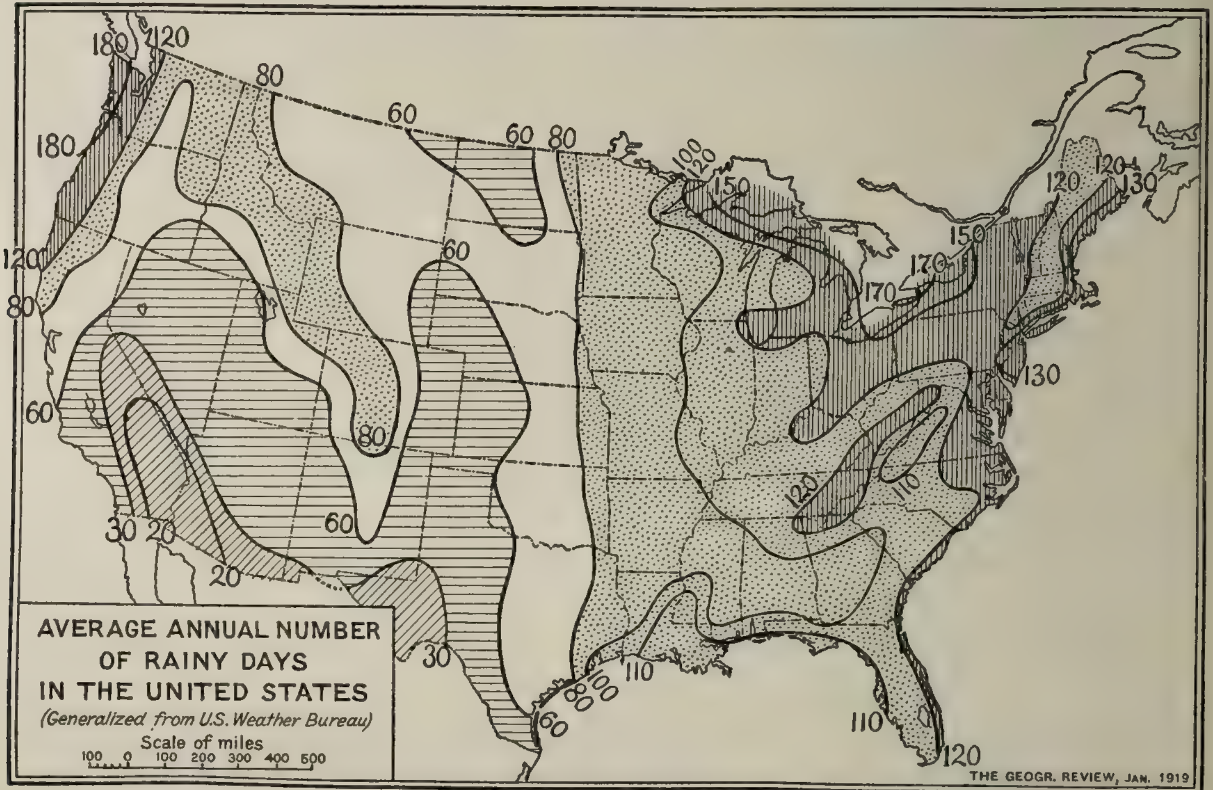


Fig. 1—Map showing the average annual number of rainy days in the United States. Scale, 1:45,000,000.

Figure 1 shows the average annual number of "rainy days" (0.01 inch or more) in the United States. It is much simplified and generalized from the latest map published by the Weather Bureau.[1] Several lines and certain small areas of local rather than general interest have been omitted, many of the lines have been "smoothed," and shading has been used for purposes of emphasis. Such broad generalizations are perfectly legitimate in studying the larger characteristics of the climates of an extended area.

---

* Read at the fourteenth annual meeting of the Association of American Geographers, Baltimore December 27-28, 1918.

[1] Average Annual Number of Days With Precipitation 0.01 Inch or More. Map, 16 x 10 ins. Weather Bureau, U. S. Dept. of Agriculture, Washington, D. C. One of a set of "Climatic Charts of the United States."

Summarizing the facts briefly, it is seen that the 95th meridian divides the country into two halves, over the eastern of which the average number of rainy days exceeds 100 a year, while over the western, with certain exceptions, rain falls on less than 100 days. From the 95th meridian eastward there is an increase in the number of rainy days, towards the Atlantic Ocean and especially towards the Great Lakes (maximum of 170). From the 95th meridian westward there is a general decrease except on the North Pacific coast, where there is a maximum of 180 rainy days. The distribution of rainy days here shown finds its explanation (1) in the cyclonic control over precipitation; (2) in the mean annual rainfall, and (3) in the distribution of rainfall through the year. The eastern maximum, in the Great Lakes region, where the annual amount of precipitation is not large, results from the frequency of cyclonic rainfalls throughout the year. On the Pacific coast, where there is a well-marked rainy season, the number of rainy days is closely related to the annual amounts of rainfall, the number of rainy days being largest where the rainfall is the heaviest. Rain falls on nearly half the days of the year on the extreme northwestern coast. Here, as also in the case of the Great Lakes, a position to leeward of an immediate source of water vapor increases the number of rainy days. The northern tier of states, from the Pacific across to the Atlantic, is the pathway most frequented by a more or less continuous succession of rain-bringing cyclones. These northern states therefore have, on the whole, more rainy days than their neighbors to the south. From north to south, on the Pacific slope, the decrease in number of rainy days is very marked, as is also the decrease in mean annual rainfall and cyclonic activity. The minimum number of rainy days in the country is found in the southwestern portion of the Southern Plateau Province.[2] Here, also, are the smallest rainfall, the minimum of storm control, and a very effective enclosure from moisture-supply. Southern California is seen to be favored, from the point of view of an outdoor life, in having so few rainy days. Many topographic controls over the number of rainy days are indicated on the map, and several others have been omitted. The effects of the Rocky Mountains stand out clearly. Local topographic effects, not shown on Figure 1, are a district over the Arizona plateaus, including Grand Canyon station and Flagstaff, with more than 60; and areas with more than 100 rainy days (1) in northern Idaho and eastern Washington and Oregon; (2) over the Yellowstone National Park, and (3) in western Colorado. An interesting local area of less than 30 rainy days a year, not shown in Figure 1, centers in southeastern Utah, over the Colorado River valley. In the east, the effect of the

---

[2] This is one of the climatic provinces into which the author has divided the United States (see R. DeC. Ward: Climatic Subdivisions of the United States,' *Bull. Amer. Geogr. Soc.*, Vol, 47, 1915, pp. 672-680; see especially Fig. 5).—EDIT. NOTE.

Appalachians is shown, especially in latitudes 35°-40°. The interior of New England has fewer rainy days than either its coast or its western margin. Several small local areas have been omitted in the east, as has one larger district (over 110) extending along the Mississippi River from Memphis, Tenn., to Dubuque, Iowa.

PROBABILITY OF RAIN

By dividing the average number of rainy days in a month or a year by the number of days in those periods, the mean monthly or mean annual *probability of rain* is determined. This value, expressed as a percentage, is a convenient and useful way of indicating the probability of occurrence of days with 0.01 inch or more of precipitation. In weather forecasting, in planning out-door work or sports, in selecting a health resort, the probability of rainy days is of real human interest. A few years ago at a well-known university center the question came up of selecting a date for the performance of an open-air pageant. The available dates were the middle of May or some time early in June. It was important, among other things, to take into account the probability of rain during the two or three days of the pageant. At the place in question June has a smaller probability of rainy days than May and also has a smaller rainfall. June, therefore, other things being equal, was, in the long run, likely to be the better month for the performance.

In 1891, General A. W. Greely, then Chief Signal Officer, published a series of maps showing the probability of rainy days for each month.[3] No later monthly charts of rain probability have been published. In a broad climatological consideration, the details of rain probability for each month are hardly necessary. The accompanying figure (Fig. 2), here published for the first time, shows the *mean annual probability of rain* in the United States. It was prepared by the writer and is based upon the latest Weather Bureau chart of the average annual number of rainy days above referred to. The lines are somewhat generalized, and some unnecessary details, chiefly of local interest, are omitted. No other map of annual rain probability has been published for nearly twenty-five years, when Professor Mark W. Harrington, then Chief of the Weather Bureau, prepared three generalized charts, of annual, greatest, and least probability of rain.[4]

The extreme northwestern coast and the Great Lakes have the greatest probability of rain. Both of them are regions of marked cyclonic activity. One day in every two days is likely to be rainy on the coast of Washington. East of the Great Plains the probability of rain is more than 20 per cent. Over much of this area, especially towards the coast and the Great Lakes, it is over 30 per cent, and more than 35 per cent of all the days of the year are likely to be rainy over a considerable portion of the Great Lakes region and on the New England coast. The central Appalachians have a slightly higher rain probability than the surrounding lowlands,[5] while to leeward, chiefly in Virginia, there is a small area under 30 per cent.

---

[3] A. W. Greely: Charts Showing the Probability of Rainy Days, Prepared from Observations for Eighteen Years. 12 maps, fol. U. S. Signal Service, Washington, D. C., 1891.

[4] Mark W. Harrington: Rainfall and Snow of the United States, Compiled to the End of 1891, With Annual, Seasonal, and Monthly Charts, *U. S. Weather Bureau Bull. C.* Text and atlas. Washington, D. C., 1894. References in atlas, Sheet XXII, 5-7; text, pp. 25-26.

With decreased cyclonic control and less favorable rainfall conditions, most of the vast area west of the 100th meridian and east of the Pacific Slope mountains has less than 20 per cent, the rain probability being somewhat greater over the Rocky Mountains and decreasing to less than 5 per cent in the arid Southwest.[6] It is seen that the New England coast and much of the Great Lakes area have more than seven times as many rainy days as southwestern Arizona; that the eastern margin of the Great Plains has half, or less than half, as many as the Oregon coast; that the southern California coast has the same rain probability as extreme southeastern Texas.

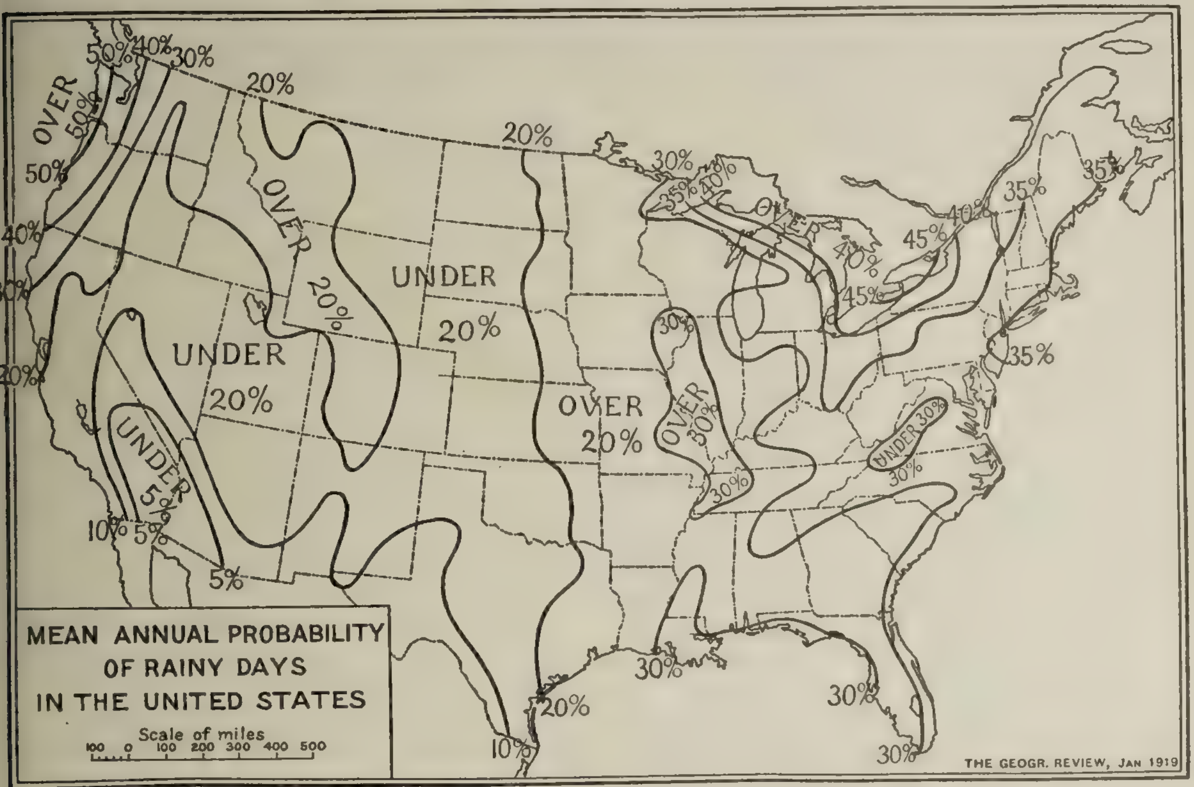


FIG. 2—Map showing the mean annual probability of rain in the United States. Scale, 1:45,000,000.

The seasons of greatest and of least probability of rain may easily be inferred from a knowledge of the seasonal distribution of rainfall in various sections of the country. The marked cyclonic activity of the colder months readily suggests that winter will bring the greatest probability of rain on the Pacific coast, over much of the western plateau area, and in considerable sections in the East, heading up towards the Great Lakes.

---

[5] Not shown in Fig. 2.

[6] Several small areas having slightly higher or slightly lower percentages than their surroundings are omitted in order to simplify the map.

Late spring and early summer bring the greatest probability over most of the Great Plains and eastward to the Mississippi Valley. The southern Atlantic and the Gulf coast, as well as the southwestern interior, have their greatest probability in middle or late summer and early autumn. About one-half of the United States has the greatest probability of rain in the warmer months. Summer, which is the ''dry season,'' brings the minimum rain probability on the Pacific coast and over most of the plateau region. East of the Rocky Mountains autumn is the dominant season of minimum probability.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Presentation of the Charles P. Daly Medal to Vilhjálmur Stefánsson; Meetings of December. At a monthly meeting of the Society on December 17, at the Engineering Societies' Building, 29 West Thirty-ninth Street, the Charles P. Daly Medal of the Society was presented to Vilhjálmur Stefánsson, the Arctic explorer.

President Greenough presided. After he had submitted the names, approved by the Council, of 21 candidates for Fellowship, all of whom were confirmed as Fellows of the Society, the award took place. In presenting the medal, President Greenough spoke as follows:

"I am charged tonight, as your representative, with the agreeable duty of presenting to the lecturer the gold medal of the Society, which bears the following inscription:

VILHJALMUR STEFANSSON
1918
HE LEARNED THE WAY OF LIFE
OF THE ESKIMO
AND IN A LONG AND HAZARDOUS JOURNEY
DISCOVERED NEW LANDS
BEYOND THE ARCTIC FRINGE OF AMERICA

"These words convey only a suggestion rather than a description of the remarkable work of the explorer, but they sufficiently indicate a distinction between what I may term the human and the scientific aspects of his performance. Each of these is entitled to the highest praise—but there is a dramatic action about the former which finds a parallel, as I think, only in the career of Dr. Livingstone in Africa. Both of the travelers alluded to cut loose from their base and trusted to their ability to find support in the regions they might visit. Both were supposed to have perished, as attested alike by rumor and by argument from experience. And both demonstrated the ability of the white man to adapt himself to any conditions under which a native race can subsist. This demonstration of Arctic potentialities is of absorbing interest and suggests the mournful reflection that many lives might have been saved in voyages like that of Sir John Franklin and of others who have succumbed to the privations of polar work.

"But the unique personal adventures of our guest must not be allowed to obscure the notable additions to geographical knowledge attained by the expedition. New lands were discovered and the boundaries of others were defined. Extensive soundings marked the limitations of the continental shelf and offered new light upon the form and extent of the Arctic basin. The American Archipelago is now much more definitely outlined, whilst the data collected as to the human geography, meteorology, botany, minerals, and animal life of the region will fill several volumes. It is the belief of our Council that the accomplishments of the enterprise are surpassed in importance or interest by few, if any, of the many memorable undertakings in the Arctic, and that the fame of its leader will be enduring. Nor can we omit a word of praise for the office of the Canadian Department of the Naval Service under whose general direction and with whose support the work was so splendidly carried through.

"And now, Sir, on behalf of the Society I beg your acceptance of this memorial of our admiration of your achievements and of our esteem for yourself, your comrades, and the neighboring government whose foresight and enterprise have been so highly rewarded. May it prove the presage of a long continuance of the agreeable and helpful relations which have existed between us in the past."

After saying a few words in acceptance of the medal, Mr. Stefánsson addressed the Society on "The Value of Northern Exploration."

At an intermonthly meeting one week before, on December 10, at which President Greenough presided, Major Douglas W. Johnson, of Columbia University and the Military Intelligence Division of the General Staff, gave an illustrated lecture entitled "Along the Front, from Belgium to the Balkans." The lecture dealt with Major Johnson's studies during the past year of the relation of topography to military strategy on all the principal sectors along the western front from the North Sea to the Aegean. This work was originally planned as part of the program of the Department of Exploration and Research of the Society. Later it was adapted to the needs of the military authorities of the Department of State.

Assumption of Publication of the *Journal of Geography* by the Society. With the first of the year the American Geographical Society has assumed management and publication of the *Journal of Geography.* Dr. Isaiah Bowman is Editor and Dr. G. M. Wrigley Associate Editor of the *Journal* under its new management. Founded in 1897 by Professor R. E. Dodge as the *Journal of School Geography,* the magazine was merged five years later with the *Bulletin of the American Bureau of Geography* and published under the present title. Eight years ago the *Journal* passed under the editorship and management of Professor R. H. Whitbeck of the University of Wisconsin.

For over twenty years the *Journal* has contributed in a very high degree towards the advancement of geography in our schools. The need that it has so well filled in the past is more urgent in the present, and the Society takes over the *Journal* at a critical time in the history of geographical education. As Professor Whitbeck says in his valedictory (*Journ. of Geogr.,* December, 1918): "We believe that the greatest epoch for American geography lies just ahead. We see evidences everywhere of new and widespread interest in world geography. If ever conditions were propitious for launching a great movement for more geography and better geography in American schools, those conditions are here today." Two articles in the January number of the *Journal* relate to these opportunities for geography: "Geography and Reconstruction in Education," by L. O. Packard of the Boston Normal School; and "A Campaign for Geography," by O. D. von Engeln of Cornell University. Other important articles in this number are "The Turk, Casual of Geography," by Leon Dominian, formerly of the Society's staff, and "The Great Lakes Waterway as a Civic and National Asset," by Eugene Van Cleef.

A movement of great significance for the future of geography in America is the recent foundation of the National Council of Geography Teachers. The organization of the Council was described by its secretary, George J. Miller, of the State Normal School, Mankato, Minn., in the *Geographical Review,* Vol. 1, 1916, pp. 363-365. The *Journal of Geography* has been adopted as official organ of the Council.

NORTH AMERICA

Changes in the Forest Area of New England Since 1620. At the time of the landing of the Pilgrim Fathers nine-tenths or more of New England must have been forested. The deforestation then begun continued steadily as the population increased so long as the region remained dependent on its own agricultural production. With the mid-nineteenth century opening-up of the Middle West and the evolution of New England as a manufacturing region deforestation was checked. In New England as a whole the agricultural area reached its maximum extent between 1870 and 1880, and, as unoccupied land here tends to revert to forest, the forest area has increased since that date. It is even reported that there has been an increase among the native wild life.

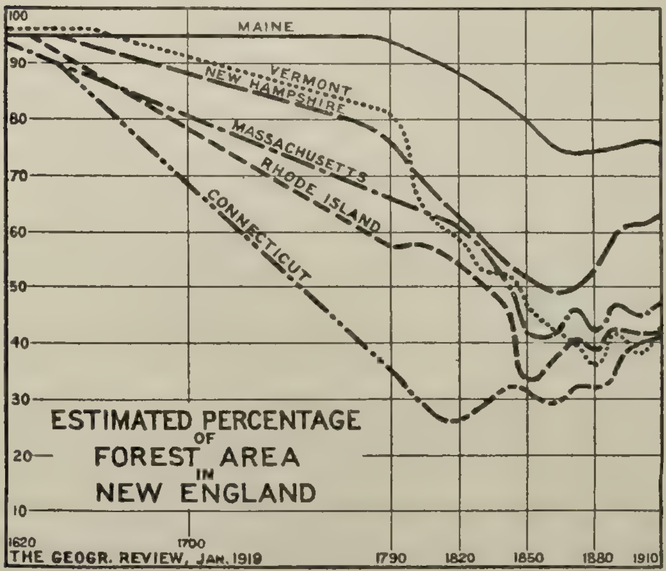


FIG. 1—Diagram showing estimated percentage of forest area in each New England state from 1620 to 1910. (Reproduced from the paper cited in the text.)

The quantitative change in the forest area has been worked out and graphically represented by R. M. Harper (Changes in the Forest Area of New England in Three Centuries, *Journ. of Forestry,* Vol. 16, 1918, pp. 442-452). Census statistics supply the basal data. Calculation proceeds on the assumption that, excluding the area originally treeless (5 per cent) and that occupied by towns, villages, etc. (1/5 acre per habitant), the land not in farms is forest. To this area is added that of the wood lots included in the farms. Complete data on farm land and wood lots, however, is only available for the years 1870, 1880, 1910. For other years as far back as 1850 the proportion of wood lots is deduced from the ratios in the known years. Beyond 1850 to the first Census year, 1790, population figures only are available. It is then assumed that the ratio of farm land is proportional to population, with modifications based on certain well-known tendencies. The ratio, for instance, tends to decrease with increase of industry. The forest decline in Connecticut, where arose an early growth of manufacturing, was checked much earlier than in Maine.

The figures for 1910 show no state with a forest cover of less than 40 per cent: Maine still has 75 per cent. A check on the method employed in arriving at these estimates is afforded by results obtained by other means. R. S. Kellogg (*U. S. Forest Service Circular 166,* 1909) gives a higher percentage of woodland for Connecticut (52 per cent against 42 per cent) and a lower percentage for Massachusetts (39 per cent against 47 per cent): his other figures are substantially the same. These conclusions, of course, simply refer to areal extent and in no wise to the quality of the forest. A qualitative survey is the concern of a timber census, for which, it may be noted in passing, there is great need.

EUROPE

The Effect of Gunfire on the Rainfall of the British Isles. A recent statement from Dr. H. R. Mill, Director of the British Rainfall Organization, the leading authority on rainfall in the British Isles, gives an answer, as definite as is possible, to the much-discussed question of the effect of the gunfire in Europe upon the amount of precipitation in Great Britain (*Symons's Meteorol. Mag.*, Feb., 1918). Two districts are selected, southeastern England, which was nearest to, and the northwestern district (comprising stations from Sutherland and the Hebrides to the west coast of Ireland), which was farthest from the scene of the firing in Flanders. The monthly rainfalls from 1909 to 1917 are summarized, in percentages of the average. In the period before the war there were 14 dry or very dry months in southeastern England and 12 wet or very wet months. During the war there were 12 dry or very dry and 13 wet or very wet months. A single month transferred from one category to the other would bring about an equality or even a reversal. In the northwest, in the same two periods, very dry months were equally numerous, and there were no very wet months. Taking dry and very dry months together, there were 7 before and 14 during the war, and of wet months there were 14 before and 15 during the war. Dr. Mill points out that much emphasis has been laid on the relative wetness of the years 1915 and 1916 in southeastern England, but this record should be considered in connection with the fact that the year 1917, when the war was in a very intense phase, had a nearly normal rainfall. R. DeC. Ward

ASIA

The Origin of the Chinese. In a recent article (The Origins of the Chinese, *Amer. Journ. of Phys. Anthropol.*, Vol. 1, 1918, pp. 183-212) Mr. E. T. Williams, Chief of the Division of Far Eastern Affairs of the State Department, discusses the origin of the Chinese out of long familiarity with the country, people, and literature. He takes up in turn the three most prevalent theories, i.e. that the Chinese migrated from the Indo-Chinese peninsula; that they originated in Central or Western Asia; and that the race is autochthonous. (For a discussion of these different theories see Comprehensive Geography of the Chinese Empire, by L. Richard; Western Origin of the Early Chinese Civilization, by Terrien de Lacouperie; The Origin of the Chinese People, by J. Ross; China, by F. von Richthofen, and Frederick Hirth's article on Chinese Origins in the Encyclopaedia Britannica.) The second of these hypotheses the author believes is best supported by available evidence. That the movement of peoples in China and Indo-China has been generally from north to south is a widely accepted opinion. This belief has furnished one of the strongest arguments for postulating a Central or West Asiatic origin of the present prevailing race. Within the past few decades studies concerning the Sumerians of the Euphrates basin have brought out unexpected similarities between this West Asiatic culture and the earliest civilization of the Chinese, particularly in vocabulary and ideograms. The explorations of Sven Hedin, Stein, Pumpelly, and Ellsworth Huntington reveal a possible motive for migration in the climatic changes which have taken place in Turkestan.

Further to strengthen this theory Mr. Williams adds the testimony of ancient Chinese traditions, embodied in their great classics. The geographical and statistical description of the empire, the so-called "Tribute of Yu," probably compiled from data earlier than 2300 B. C., includes account of a region in the west which would seem to have been occupied many centuries earlier by the Chinese. Other traditions are found to point to the western origin of the race. Moreover Mr. Williams believes that in references to the "I" peoples from which early Chinese emperors sprung, there is no implication that these tribes were "wild" or "barbarians," as their name has usually been translated, but that, on the contrary, they were already possessed of an advanced culture when they first appeared in Chinese history, a culture which he supposes they must have brought with them from an earlier abode in the west.

The geography of northwest China lends support to this view. It is scarcely conceivable that a great migration could have crossed the Kuen-lun range of mountains, over which exist few passes and only extremely difficult trails. This barrier would have effectually prevented any extensive movement into the upper valley of the Hoang and the Wei Rivers, where it is generally admitted the Chinese first appear on the scene and from which they spread over the rest of the empire. On the other hand, access from the westward is easy. In that direction the important natural highway leading from the Wei valley, through the Yu-men or Jade Gateway at the base of the Nan Shan range, toward eastern Turkestan, is known to have been in use for many centuries. Along this route a migrating people could easily move, either from the shepherd country of the arid uplands or from the crowded oases of a diminishing tillable area farther west.

WORLD AS A WHOLE AND LARGER PARTS

Man's Distribution Over the Earth. The last contributions to the *Annales de Géographie* of the late Professor Vidal de la Blache, the dean of French geographers, have for their theme certain principles governing man's distribution over the earth. The two articles are ''La répartition des hommes sur le globe'' (March and July, 1917), and ''Les grandes agglomérations humaines: Afrique et Asie; Europe—Remarques générales; Régions méditerranéennes'' (November, 1917, March and May, 1918).

Darwin's phrase describing the dispersal of man as ''vast and precocious'' expresses no less the foundation of his present-day distribution. To remark on man's ubiquitousness is trite; yet there is really something astonishing in his occupation of the fringes and the undesirable corners of the earth. A surprising tide of human life beats against the inhospitable borders of the North Polar regions. In the High Andes of southern Peru there are permanent habitations nearly three miles above sea level in an atmosphere rarefied to a pressure not much more than half normal. Tuareg tribes of the Sahara, numerically small as they are, are yet in excess of the resources of their domain. On the other hand the comparatively low population density of certain areas is not in relation with their value for the support of man. The causes of these anomalies are doubtless many and involved, but they must be credited in part to the sporadic nature of man's original dispersal, a dispersal, it may be noted, that owes much to the Promethean gift, the universal possession of mankind. Early human occupation of the earth must have been attenuated, as it was widespread. Probably its highest density would be reached along shores where fishing supported unusual numbers; the enormous kitchen middens existing on various coasts seem to offer evidence in point. Real condensation of human groups, however, could come only with sedentary occupation of the soil. When man began the accumulation of a patrimony he could obey the command to ''increase and multiply.''

In two of the world's three great areas of dense population the command has been obeyed from ancient times, that is in India and in China proper with Japan. Out of the estimated world total (1913) of 1,631,500,000 China had 326,000,000 and Japan 52,000,000, India 302,000,000. Europe, the modern unit of high population density, had 448,000,000. Growth of the East and the West, of the old and the modern agglomerations, has proceeded along lines as essentially different as are their geographical settings.

The Asiatic agglomerations were born and have flourished in a zone roughly defined by the parallels of 10° and 40° north latitude. India and China are countries of the monsoon, with temperatures and rainfall favorable to the growth of vegetation useful to man. Botanical research has shown that, with the Sudan and the Mediterranean, these are the regions that have contributed the greatest proportion of our alimentary plants. Bound up with their human exploitation is the management of the water supplied directly by the periodic rains and indirectly by their associated floods. The practice of irrigation on larger or smaller scale is universal, from its restrained application in the oases fringing the mountain periphery to the unbounded possibilities in the plains of the Ganges and Hoang-ho. It is the outstanding feature of Asiatic cultivation.

The cultivation that follows the great rivers, progressively expanding from the intermontane basins to the great alluvial plains of the lowlands, is a concomitant of the human movements of sedimentation and expansion that have pursued the same course. From early times the two countries of the great Asiatic agglomeration have been regions of attraction; they form a *zone of increment* where man's labor brought prompt and ample reward. Chinese tradition points to an origin in the west, and in fact the bonds with the Central Asian oases through Kansu and Shensi have never been broken. Human occupation of the great alluvial plains has been progressive: the deltaic lands, so responsive when once brought under control, demand the collective work only possible under a high organization possessed of infinite human resources. To ''increase and multiply'' here was a necessity of effective occupation. Economic compulsion transformed into a religious function cult of the family—marriage and procreation: population needs became an affair of the state.

Like China, India has seen progressive human enrichment. The Punjab matches the ''historic vestibules'' of Kansu and Shensi as a transition country. As in China, flow of the human currents has left recognizable traces. A sort of religious consecration attaches itself to the land where the poor and laborious populations from the arid belt entered into the richer and fuller life of the monsoon zone. The upper Ganges to Benares is the blessed country of the Brahmin. Here the village type conserves in almost complete purity its Aryan character.

The great Oriental agglomerations cease more or less abruptly at about the fortieth parallel, that is approximately the latitude where the European mass begins. The European block of dense population extends northward to the sixtieth parallel, where it is characteristically demarcated by a line of great towns, Bergen, Christiania, Stockholm, Helsingfors, Petrograd. On the east it is approximately defined by the limit of sedentary population and the line of towns, Kazan, Samara, Saratov, Astrakhan. Evolution here has been much more complex.

The Mediterranean must early have figured as a zone of increment, approaching the monsoon regions in favorable conditions. It is distinguished from them climatically by occurrence of the rainy season during the winter, whence cultivation has taken on a different aspect. Mediterranean culture, however, has arisen in contact with that of the ancient centers of the Near East, Egypt and Mesopotamia, and has learned much from them. While irrigation is employed in the Mediterranean zone of summer drought, the distinguishing feature of cultivation is related to the humid subsoil, a reservoir filled by the winter rains, a resource that can be tapped by deep-rooted forms of vegetation. The Mediterranean is the land of fruit; tree cultivation is the basis of the early dense centers of population. Under propitious (historical) circumstances this population has always tended to increase; the proletariat of southern Italy presents certain analogies with the surcharged populations of the Orient.

Yet the European countries where man is enfranchised from effort are the exception. Away from the Mediterranean border the needs of shelter, clothing, heating, and lighting singularly complicate the problem of existence and leave little room for the *far niente* of the lands of increment. The principle of growth of these greatest agglomerations, so recent in origin, is the development of mechanical invention. Accompanying are two distinguishing phenomena, emigration on a large scale, an epochal event in the history of man's distribution, and the growth of urban life.

GEOGRAPHICAL NEWS

Personal

Professor Edward W. Berry, professor of paleontology, and **Dr. Joseph T. Singewald, Jr.**, professor of economic geology, of the Johns Hopkins University, will sail in April for South America, where they will spend six or seven months in geological explorations in the Andes of Peru, Bolivia, and Chile. The expedition will be made under the auspices of the George Huntington Williams Memorial fund which was recently provided through the generosity of Mrs. George Huntington Williams in memory of her husband, who at the time of his death was head of the department of geology at the Johns Hopkins University.

Dr. Filippo de Filippi was awarded its Prix Tchihatchef by the Academy of Sciences of Paris on December 2, 1918, in recognition of the geographical results of his expedition to the Karakorum and other regions of Central Asia in 1913-14.

Mr. Frederick K. Morris of Columbia University gave an address on ''The Fourth Year of the War'' at the general meeting of the New York Academy of Sciences on January 20. The address dealt with the relation of topography to the military campaigns.

Obituary

Dr. Charles R. Van Hise, president of the University of Wisconsin and eminent as a geologist, died on November 19 at the age of 61 years. Among Dr. Van Hise's numerous fundamental publications, those of greatest interest to geographers are: ''The Geology of the Lake Superior Region'' (with C. K. Leith), *U. S. Geol. Surv. Monograph 52*, 1911; ''The Iron-ore Deposits of the Lake Superior Region,'' *U. S. Geol. Survey 21st Annual Report for 1899-1900*, Part III, Report c, 1901; ''The Conservation of Natural Resources in the United States,'' New York, 1910.

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

United States

Western States

James, G. W. **Reclaiming the arid West: The story of the United States Reclamation Service.** xxii and 411 pp.; ills., index. Dodd, Mead & Co., New York, 1917. $3.50. 9 x 6.

La Rue, E. C. **Colorado River and its utilization.** Introduction by N. C. Grover. 231 pp.; maps, diagrs., ills., index. *U. S. Geol. Survey Water-Supply Paper 395.* Washington, D. C., 1916. 9 x 6.

The practical application of the results of the study of geography is well illustrated in these publications, which may well be considered together as they supplement each other. The first is an account of the results which have flowed from the studies of the arid regions of the United States initiated by John Wesley Powell shortly after the Civil War and continued through his efforts by what was known as the Powell Irrigation Survey. This survey, begun in 1888, culminated in the creation of the Hydrographic or Water Resources Branch of the U. S. Geological Survey and later in the U. S. Reclamation Service, which, in breaking off from the parent body, became an independent organization under Major Powell's successor, Charles D. Walcott, now Secretary of the Smithsonian Institution.

Mr. James shows in a picturesque way the struggles of the men who, lured on by the vast unknown deserts of the arid West, and held by the vision of things which might be done there, spent the best of their lives and energies in its exploration. These men had vision without being visionary, and many of them have lived to see even their wildest dreams surpassed by the developments resulting from the knowledge they obtained and its use by engineering methods.

In "Reclaiming the Arid West" there are traced out the early struggles of the pioneers and of the advocates of the passage of the Reclamation, or Newlands, Act; the efforts to apply this are described, and then the writer takes up alphabetically by states the character of the work achieved, dressing in somewhat poetic language the dry facts as to areas, localities, size and cost of reservoirs, canals, and irrigated lands. The book closes with a "vision of the future" which points out the fact that the results already accomplished, though large in themselves, are but small compared to what may be done and at the same time emphasizes the dangers which are to be met and overcome in the extension of the work.

Parallel with this book should be consulted the last annual report of the Reclamation Service, which gives in concise form the data which form the basis of the more popular work (A. P. Davis: *Sixteenth Annual Report U. S. Reclamation Service,* 598 pp. and map, Washington, D. C., 1917).

As a still further illustration of the kind of problems which have been successfully met in the past and which yet remain to be solved on a still larger scale, is the description by Mr. La Rue of the Colorado River, one of the principal streams of the arid West. In the physical description of the river a comparison is drawn with the basin of the Nile, and certain points of similarity are brought out, especially as these bear upon engineering problems. The greater part of the report, however, is devoted to the discussion of the water supply and of the more complete use of this water in reclaiming desert areas, especially through storage in reservoirs near the headwaters. The almost equally important matter of power development is described by Mr. La Rue; his estimates cover the developed and undeveloped power sites, the market for power, and the possibilities. It is pointed out that complete utilization and control of the water will necessitate the creation of storage of 3,800,000 acre feet of water to be made available for irrigation. It is estimated that the irrigable area along the lower portion of the river aggregates 2,730,000 acres and will need annually for complete development 13,670,000 acre feet of water.

Of general geographic interest is the study of the silt in the water of the Colorado River and of the annual fluctuations of quantity of water in the streams, comparison being made with the behavior of Great Salt Lake, which has shown a gradual increase in volume from the time when the records began in 1850 up to 1868, continuing high with some fluctuations to 1877 and then declining in a general way until 1905, when the lake began to recover and rise slowly to a little above the height of 1850.

The mass of geographic and hydrographic data which are needed by the engineers are illustrated in this report on the Colorado River. It affords a glimpse of the engineering foundations which are deeply buried out of sight and on which may be erected the superstructures visualized in the description of Mr. James. F. H. NEWELL

BOVEE, G. G. **Bibliography and index of Wyoming geology, 1823–1916.** Index. *State of Wyoming Geol. Bull. 17,* pp. 319-446. Cheyenne, 1918.

CARY, MERRITT. **Life zone investigations in Wyoming.** 95 pp.; maps, ills., index. *North American Fauna No. 42.* Bur. of Biol. Survey, U. S. Dept. of Agric., Washington, D. C., 1917.

CHURCH, J. E., JR. **Snow surveying: Its problems and their present phases with reference to Mount Rose, Nevada, and vicinity.** Diagrs., ill. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 496-549 (discussion, pp. 548-549). Washington, D. C., 1917.

CLELAND, R. G. **Asiatic trade and the American occupation of the Pacific coast.** *Ann. Rept. Amer. Hist. Assoc. for the Year 1914,* Vol. 1, pp. 283-289. Washington, D. C., 1916. [Treats of the acquisition of Oregon and California.]

CLELAND, R. G. **Larkin's description of California.** *Ann. Publs. Hist. Soc. of Southern California,* Vol. 10, 1917, Part III, pp. 70-74. Los Angeles. [''General account of the province,'' Part I of the official document prepared by T. O. Larkin for President Polk. The original, with other Larkin papers, is preserved in the Bancroft Library of the University of California.]

SOUTH AMERICA

ECUADOR, PERU, BOLIVIA

POSNANSKY, ARTURO. **Una metrópoli prehistórica en la América del Sud.** Vol. 1, 184 pp.; diagrs., ills. Dietrich Reimer (Ernest Vohsen), Berlin, 1914. $12. 13 x 10.

This sumptuous work is remarkable for violently contrasting qualities. It is splendidly printed on the finest paper and is full of illustrations which can only be described as magnificent. It has, however, some pronounced faults. The author, a well-known Bolivian civil engineer, with but little anthropological training and information, is so unlucky as to be obsessed with a number of manias concerning the cultures which he describes. One of his fixed beliefs is that the ruins of Tiahuanaco, if they are to be interesting, must be shown to have an antiquity which is little short of laughable to those who are abreast of modern anthropological research. His methods for proving his preconceived theories to be facts are little short of amazing. The Rodadero at Cuzco, a slickensided ledge, is asserted to have a glacial origin. Earthquakes are invoked to alter lake levels and outlines without a shadow of independent evidence. Nine-tenths of every scientific argument in the work is sheer romance. Into the midst of a very good description of the geological processes by which the former inland sea shrunk to the present Lake Titicaca he interjects the astonishing statement that the memory of the event is perpetuated in folklore!

Even though the claim that Tiahuanaco was once a port were not already refuted by Dr. Wiesse, who speaks of the ruins of Llojepaya on the present-day border of Lake Titicaca, it would never be substantiated by the arguments of Mr. Posnansky. He pretends that the presence of canals at Tiahuanaco proves that the lake then came to the city. Is it not more likely that the canals were built because the lake did *not* come to the city, and because it was necessary to lead water thither? In the case of the ''tired stones'' scattered over the plain between Tiahuanaco and the present edge of the lake, it is claimed that they fell overboard from *balsas* while being carried to their destination from the quarries. Mr. Posnansky withholds from us his means of knowing that the stones were carried in *balsas* and not by men (p. 30).

On page 35 Mr. Posnansky says: ''Concerning the enormous space of time which elapsed between the epoch [of Tiahuanaco] and the present day it is scarcely possible to form an opinion if one bears in mind the span of years necessary to permit the lake to lose, by immersion and evaporation, a quantity of water sufficient to reduce it to its present level.'' The alleged difference between the level of the lake in Tiahuanaco times and the present is 34 meters. The next statement made by Posnansky is that the level of the lake is still sinking, but there is no adequate argument in support of this conclusion. The book has good points, of course. Its many illustrations are invaluable, and the plans of the site are of the greatest accuracy and usefulness. Chapter 5, with its cranial measurements of thirty-five skulls (measurements arrived at by a remarkably complicated method) is of the highest importance. It contains full and valuable data as to the cranial character of the Tiahuanaco people. One is somewhat surprised to find, on examining Plate IV, that an ordinary Aymará (or rather Colla) skull is described as ''fossil''.

Chapters 6-9 are the best in the book, and they are undeniably of considerable value. In the first place, Mr. Posnansky has done a fine piece of work in pointing out that the masonry at Tiahuanaco falls into two chronological groups. It is deplorable that he insists on regarding what are in reality two phases or stages of one culture as two distinct and separated cultures. He seems to be unaware of the contact between the culture of Tiahuanaco with those of the coast of Peru on the one hand and with those of the forest region on the other. With these exceptions, the description of the two phases of Tiahuanaco culture is good.

Finally, Chapters 10-13, though marred by the presence of all sorts of unwarranted assumptions, conjectures, and groundless theories, are a veritable museum of the conventional *motifs* of Tiahuanaco art at its best. Whatever vagaries the writer may have indulged in, he has given us a volume replete with material for forming our own conceptions of Tiahuanaco culture, and for that we should thank him.

PHILIP AINSWORTH MEANS

BALLIVIÁN, M. V., AND W. C. TOVAR. **Noticia histórica y clasificación de la papa de Bolivia.** 22 pp.; ills. Ismael Argote, La Paz, 1914. [Abstracted in the *Review*, Vol. 4, 1917, p. 318.]

BANDELIER, A. F. **Las islas de Titicaca y Koati.** Spanish translation by Edmundo Sologuren, M. V. Ballivián, and B. D. Romero. Vol. 1, No. 1: viii and 134 pp.; No. 2, pp. 135-392; Vol. II: No. 3, pp. 393-609; No. 4, pp. 611-790 and lviii. Bibliogr. Soc. Geogr. de la Paz, and Dir. Gen. de Estadística y Estudios Geogr., La Paz, 1914-16. 8½ x 6 each. [To this Spanish translation of Bandelier's ''The Islands of Titicaca and Koati'' (New York, 1910) is appended a bibliographical notice by Ballivián.]

BAYLESS, S. E. **Iquitos—Peru's important rubber center.** Map, ills. *Bull. Pan Amer. Union,* Vol. 43, 1916, No. 6, pp. 690-705. [Spanish version in *Bol. Unión Panamericana,* Vol. 44, 1917, No. 3, pp. 309-324. Iquitos is now estimated to possess a dry season population of 12,000 to 15,000: in the wet season it rises to about 30,000.]

BERRY, E. W. **The age of the Bolivian Andes.** *Proc. Natl. Acad. of Sci.,* Vol. 3, 1917, pp. 283-285.

BINGHAM, HIRAM. **The Inca peoples and their culture.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 1, Section 1: Anthropology, pp. 160-167. Washington, D. C., 1917. Also published in *Proc. 19th Internatl. Congr. of Americanists Held at Washington, Dec. 27-31, 1915,* pp. 253-260, [Smithsonian Institution,] Washington, D. C., 1917.

—— **Bolivia: General descriptive data.** 31 pp.; ills. Pan American Union, Washington, D. C., 1916.

—— **Bolivia, The lowlands of: A little known but very interesting district of South America.** *The South American,* Vol. 5, 1917, No. 4, p. 14. [Santa Cruz de la Sierra.]

BRANDES, A. **Bolivia.** Map, bibliogr. *Tijdschr. Kon. Nederl. Aardrijk. Genoot.,* Vol. 34, 1917, No. 2, pp. 211-227.

CARVAJAL, M. M. **Extensión superficial del Perú.** *Bol. Soc. Geogr. de Lima,* Vol. 31, 1915, No. 1, pp. 45-50. [Abstracted in the *Review,* Vol. 4, 1917, p. 220.]

—— **Ecuador: General descriptive data.** 31 pp.; ills. Pan American Union, Washington, D. C., 1916.

HOLDICH, T. H. **The geographical results of the Peru-Bolivia Boundary Commission.** Ills. *Geogr. Journ.,* Vol. 47, 1916, No. 2, pp. 95-116 (discussion, pp. 113-116).

KROEBER, A. L. **Floral relations among the Galápagos Islands.** *Univ. of California Publs. in Botany,* Vol. 6, 1916, No. 9, pp. 199-220.

LA PUENTE, IGNACIO. **Paludismo en la costa del Perú.** *Boll. Soc. Geogr. de Lima,* Vol. 31, 1915, No. 1, pp. 34-44; No. 2, pp. 146-169; No. 3, pp. 273-299; No. 4, pp. 372-376.

Léon, J. M. Y. **Yacimientos carboníferos de las provincias de Pallasca, Huaylas, y Yungay.** 85 pp.; maps, diagrs., ills. *Bol. Cuerpo de Ingenieros de Minas del Perú No. 90,* Lima, 1918. [The conclusion reached by this Peruvian engineer is that anthracite of good quality exists in this field in sufficient quantities to repay development on a large scale, in spite of difficult transportation and a lack of timber for construction work. Cheap labor, sufficient food supply, and abundant water power would facilitate operations.]

BRAZIL

Elliott, L. E. **Brazil today and tomorrow.** xi and 338 pp.; maps, ills., index. The Macmillan Co., New York, 1917. $2.25. 8 x 5½.

This attractively bound and finely illustrated book covers a wide range of topics, beginning with a geographical description and a résumé of the history of the country and ending with the foreign trade. In between are chapters on Colonization, Social Conditions, Transportation, Industries, Currency, and the World's Horticultural and Medicinal Debt to Brazil. Where so many topics are treated concerning a country of such vast size, much is inevitably sketchy and incomplete. Nevertheless, the work is such as will well serve to introduce a reader to the great land it describes. Miss Elliott writes with unconcealed admiration for the land and people, and one feels that frequently her admiration has led to overpraise or to the ignoring of some topics that might be distasteful to her Brazilian friends. Taken as a whole, however, the book is above the average of the many publications of the popular "travel and description" type. G. B. Roorbach

—— **Brazil: General descriptive data.** 31 pp.; ills. Pan American Union, Washington, D. C., 1917.

C(apra), G(iuseppe). **Tra i coloni Italiani nello stato de San Paolo.** Ills. *Italica Gens,* Vol. 6, 1915, No. 3-6, pp. 109-119. Turin.

Carvalho, C. Delgado de. **The geography of Brazil in relation to its political and economic development.** Maps, ills. *Scottish Geogr. Mag.,* Vol. 34, 1918, No. 2, pp. 41-55.

Chisholm, G. G. **The meteorology and climatology of Brazil: A review.** *Scottish Geogr. Mag.,* Vol. 33, 1917, No. 7, pp. 315-325. [Review of "Météorologie du Brésil," by C. M. Delgado de Carvalho, reviewed in the *Geogr. Rev.,* Vol. 4, 1917, p. 411.]

Costa, D. F. da. **Levantamento magnetico do valle do Rio S. Francisco: Relatorio e resumo dos resultados.** Preface by H. Morize. 39 pp.; map, diagrs. Directoria de Meteorol. e Astron., Minist. da Agric., Industria e Commercio, Observatorio Nacl. do Rio de Janeiro, 1914.

Crandall, Roderic. **General geography and climate of northeastern Brazil.** Map. *Atti X Congr. Internaz. di Geogr., Roma, 1913,* pp. 966-975. Reale Società Geografica, Rome, 1915. [Section I describes the topographical elements of the region: Section II, climatic features in relation to topography, is the outline of an article published by the Inspectoria das Obras Contra as Seccas, Rio de Janeiro, 1911.]

Godinho, Victor. **Climatologia—Campos do Jordão—S. Paulo.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 10, Section 8, Part 2: Public Health and Medicine, pp. 247-248. Washington, D. C., 1917. [A district suitable for health resort or sanatorium.]

Hoover, C. L. **São Paulo.** *Suppl. to Commerce Repts.,* Ann. Ser., 1917, No. 40a, pp. 14-26. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C. [Besides the general trade conditions of Brazil, this number contains a twelve-page description of the state of São Paulo, its topography, climate, people, resources, etc., with up-to-date statistics.]

Lacerda, Joaquim. **La baie de Rio de Janeiro: Guide.** 72 pp.; map, ills. Rodrigues & Co., Rio de Janeiro, 1913. 7 x 5.

Lee, S. T. **The cattle industry in Rio Grande do Sul.** *Commerce Repts.,* 1917, No. 183, pp. 489-491. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

Lyra, A. T. de. **Dominio Hollandez no Brasil, especialmente no Rio Grande do Norte.** *Rev. Inst. Hist e Geogr. Brasileiro,* Special Vol., 1915, Part I, pp. 439-506. Rio de Janeiro.

EUROPE

British Isles

Jackman, W. T. **The development of transportation in modern England.** Vol. 1: xvi and 459 pp., maps; Vol. 2: vii and pp. 461-820, map, bibliogr., index. University Press, Cambridge, and G. P. Putnam's Sons, New York, 1916. 24s. for both vols. 10 x 7.

This is a study, based upon primary sources, of the economic history of England from the standpoint of transportation. The term ''modern'' as used by the author, is understood to embrace the period of history between the close of the fifteenth and the middle of the nineteenth century. The study is not carried beyond 1850 for two reasons: (1) the bicycle, automobile, and other motor vehicles have profoundly affected road transportation, and their influence is considered too difficult to measure as yet; and (2) the various railroad systems were well outlined by 1850, and their history has been adequately written by other authorities. It should be noted that the discussion of the English canals is brought down to date, largely because of the present-day interest in the development of internal waterways. As an appropriate background for the study, an introductory chapter summarizes the development of transportation in England between the time of the Roman occupation and the close of the fifteenth century.

Volume 1 covers the history of road-building and of inland navigation. Down to 1750, some progress had been made in supplying the country with roads adaptable to economic needs, but for six months of the year fully a majority of the highways were in such poor condition as to make access to good markets very difficult. After 1750 more attention was given to the subject of good roads, and this was due chiefly to a greater need. England was then about to enter upon an era of great industrial expansion. Her foreign trade also was expanding, stimulated in part at least by the extension of the Empire into the four corners of the earth. The importation of raw materials, the growth of manufactures, the exportation of manufactured goods to the colonies and to the Continent combined to quicken internal trade as well. If industry was not to be checked, the cost of transportation must be reduced to a minimum and the means of transportation increased. Hence the development of roads and the building of canals. The profession of road engineer evolved. The first was John Metcalfe, a native of Yorkshire, who constructed several important highways in Yorkshire and Lancashire. Others followed, each in turn leaving his impress. The two most distinguished names are those of Thomas Telford and John Macadam—the latter remembered in several countries today by macadamized roads. The important work of these famous engineers and their influence upon road building and legislation in England are well set forth by the author. By the close of the period, the main roads of England and many crossroads as well were in a condition befitting a nation whose position industrially and commercially was supreme.

The improvement of rivers, the building of canals, and the ultimate application of steam power to the propulsion of boats on the canals and rivers are well set forth.

Volume 2 is concerned with the evolution of the railways, the effect of steam upon road transportation, and the competition of railways and canals. Altogether, the two volumes contain nine chapters varying in length from 6 to over 140 pages. There are numerous appendixes containing interesting statistical and other data. An extensive classified bibliography of upwards of 60 pages is included. There are good maps of the Roman roads of England and Wales, and of the canals and early railroads of the country. A map showing the railroads of England and Wales about the middle of the nineteenth century has been reproduced from Collins's Railway Map of England.

As a whole, the two volumes constitute a detailed scholarly contribution to transportation literature and correspond somewhat with Meyer's recent volume dealing with the history of transportation in the United States and published by the Carnegie Institution of Washington (*Publ. 215 C*) as one of their series of important works on Contributions to American Economic History. Avard L. Bishop

—— **Economic empire, The [which] Great Britain is welding together.** Map. *The Americas*, Vol. 4, 1918, No. 5, pp. 1-6.

Fox, Francis. **Geographical aspects of the Channel tunnel.** Map, diagr., ill. *Geogr. Journ.*, Vol. 50, 1917, No. 2, pp. 106-116 (discussion, pp. 113-116.)

Hall, A. D. **Agriculture after the war.** vii and 137 pp.; diagrs. E. P. Dutton & Co., New York, 1916. 7½ x 5. [An admirable survey of agricultural reconstruction in Britain, its possibilities and problems.]

Lucas, C. P. **The beginnings of English overseas enterprise: A prelude to the Empire.** 203 pp.; index. Clarendon Press, Oxford, and Oxford University Press, New York, 1917. $2.15. 9 x 6.

AFRICA

GENERAL

BROWN, A. S. AND G. G., edits. **The guide to South and East Africa, for the use of tourists, sportsmen, invalids, and settlers. 1916 edit.** li and 773 pp.; maps, index. Sampson Low, Marston & Co., Ltd., London, and J. C. Juta & Co., Cape Town, etc., 1916. 1s. 7½ x 5.

This annual has been issued for more than twenty years. It has grown much in quantity and quality of information and is undoubtedly the best periodical compendium of a large variety of data, including geographical, relating to the southern half of Africa. The best sources of information are used in the compilation. It shows what localities stand for in economic, developmental, and many other senses. The 27 pages given to "Gold in South Africa" will interest not only mineralogists and miners but general readers also. Even when only a few lines are given to a topic the vital point is included. Nearly a score of facts about Port Alfred are given in a third of a page. The book does not say that it is one of the most charming spots in all South Africa, but the reader gets the impression and is correct. The maps by Philip of London are excellent.

CYRUS C. ADAMS

CUFINO, LUIGI. **Nel Mar Rosso: Rendiconto di una missione inviata dalla Società Africana d'Italia, Aprile-Luglio, 1913.** xv and 191 pp.; map, ills. Società Africana d'Italia, Naples, 1914. 10 x 7.

The information this book contains was collected by the author in 1913. He was sent out by the Italian African Society to study the economic and commercial conditions of the Red Sea ports and the regions tributary to them. The ports he describes and characterizes are Ports Said and Suez; Port Sudan, the chief harbor of the Anglo-Egyptian Sudan; Suakin, which has been largely replaced in the Anglo-Egyptian trade by Port Sudan; Massawa, the leading port of the Italian colony of Eritrea; also the inland town of Asmara on the highland of Eritrea, now the capital of the colony and the outfitting point for caravans in the Abyssinian trade; and Asab near the southern end of the Red Sea, which serves the narrow hinterland between the sea and the heights of the Abyssinian plateau.

The Arabian port of Aden is discussed because it greatly facilitates the trade that is springing up between these east African regions and the Far East; for the Red Sea ports are only way stations, their business with the Far East being transshipped either east or west at Aden.

Port Sudan is the wonder of all these Red Sea ports. For years Suakin, connected by rail with Berber on the Nile, was the port through which was sent and received the growing trade of all the Anglo-Egyptian Sudan. But since 1906 the railroad from the Nile has been extended north of Suakin to Port Sudan, which is now the outlet and inlet of most of the trade with the Anglo-Egyptian Sudan. The trade of this port in 1912 was about $5,000,000, nearly three times as great as in 1909.

Massawa, the leading port of the Italian colony of Eritrea, naturally controls the larger part of the trade with the hinterland of that colony, the northeastern Sudan and northern Abyssinia; but Port Sudan to the north and Djibouti in the south are taking away much of its trade.

The book is a worthy contribution to the economic geography of a part of the East African seaboard that is growing in importance with the development of its hinterland.

CYRUS C. ADAMS

GIANNITRAPANI, LUIGI. **Problemi coloniali.** *Boll. Reale Soc. Geogr. Italiana*, Vol. 6, 1917, No. 7-8, pp. 564-567. Rome. [A review of "L'Africa dopo la guerra e l'Italia" by Orazio Pedrazzi, Florence, 1917.]

LYONS, H. G. **The distribution of pressure and the air circulation over northern Africa.** Maps. *Quart. Journ. Royal Meteorol. Soc.*, No. 182, Vol. 43, 1917, pp. 116-150. London.

MACKENZIE, J. K. **An African Trail.** 222 pp.; ills., bibliogr., index. **African adventurers.** 119 pp.; ills., bibliogr. Central Committee on the United Study of Foreign Missions, West Medford, Mass., 1917. 50 cents each. 7½ x 5. [These are the latest of Miss Mackenzie's exceptional books. She is gifted as a writer, has lived long among the primitive Bantus of West Africa, knows what they think and feel, and writes of them with rare insight, with affectionate appreciation of the good she finds in them, and with sympathy for their shortcomings.—C. C. A.]

Meinhof, Carl. **An introduction to the study of African languages.** Translated by A. Werner. 169 pp.; map. E. P. Dutton & Co., New York, and J. M. Dent & Sons, Ltd., London, 1915. $1.75. 7 x 5.

Metcalfe, Charles. **Railway development of Africa, present and future.** *Geogr. Journ.*, Vol. 47, 1916, No. 1, pp. 3-21 (discussion, pp. 17-21). [Abstracted in the *Review*, Vol. 1, 1916, pp. 375-376.]

—— ***Africa, 1:250,000. Anglo-Egyptian Sudan, Sheets 54-P (Abu Zabad); 66-C (Roseires). Anglo-Egyptian Sudan and French Equatorial Africa, Sheet 77-B (Deim Zubeir).*** Survey Office, Khartoum, 1915-1917.

ASIA

Turkey in Asia, Arabia, Caucasia, Iran

Jastrow, Morris, Jr. **The war and the Bagdad Railway: The story of Asia Minor and its relation to the present conflict.** 160 pp.; map, ills. J. B. Lippincott Co., Philadelphia, 1917. $1.50. 8 x 5½.

The history of Asiatic Turkey is a record of traffic and transportation. So well has the author been aware of this that he has brought together a history of the inception and progress of the Bagdad Railway and a sketch of the history of Asia Minor in its relation to the great civilizations of antiquity. From these accounts the reader acquires a just intimation of the value of the control of the highway connecting the Bosporus and the Persian Gulf—particularly as it affects the domination of the Near East.

The problem is fundamentally one of geography, and to this the author alludes only in part. Ratzel, however, had previously developed the idea in his usual masterly fashion, showing that periods of prosperity in Asia Minor corresponded to periods in which roads were adequately policed and travel was safe. This condition was in existence some six centuries before Christ and lasted through Byzantine times. But the coming of the Turks brought devastation and stopped human circulation. Poverty grew as travel diminished. Later a crushing blow to land travel in Asiatic Turkey was inflicted by the cutting of the Suez Canal and the consequent diversion of traffic to sea lanes. The construction of the Bagdad Railway will help to restore the region's ancient prosperity.

As a phase of Germany's imperialistic schemes the story of the negotiations which led to German control of this important railway deserves attentive reading. The author writes with a historian's breadth of view, giving all the while a step-by-step account in which he has managed to crowd an amazing wealth of detail. The close co-operation of the government with private financial institutions in Germany is prominently brought out. But throughout his pages Professor Jastrow has a tendency to present the German case of the Bagdad Railway history, and he deals with British activity in the spirit of the German writers who have dwelt on this much-discussed topic. One feels, moreover, that he would have added to the value of his work by presenting a clear analysis of the reasons why Germany was allowed so much free scope in Turkish enterprises by Great Britain and France.

In his survey of Asia Minor in antiquity Professor Jastrow covers familiar ground. Yet he assigns Hittite to the Aryan group of languages and attributes the origin of the people to the steppes of southern Russia without presenting his proofs. The point is of sufficient importance at present to have deserved better support.

The map accompanying his text shows railways in pre-war Turkish territory. The Bagdad line is emphasized by means of red color, but it is doubtful whether the three branches shown in northern Mesopotamia actually exist. The side line to Felujah, built by the British after the capture of Bagdad, is not indicated. Neither is the line connecting Palestine with Egypt shown. In this region the map contains the Turco-Egyptian boundary as it stood prior to the rectification of 1906. These omissions, however, do not impair the usefulness of Professor Jastrow's work. More than passing credit is due him for his able treatment of the Bagdad Railway problem in its historical setting.

Leon Dominian

Genocchi, Giovanni. **La Palestina nella geografia e nella storia.** Ills. *Boll. Reale Soc. Geogr. Italiana*, Vol. 7, 1918, No. 3-4, pp. 272-285. Rome.

Lybyer, A. H. **The influence of the rise of the Ottoman Turks upon the routes of Oriental trade.** *Ann. Rept. Amer. Hist. Assoc. for the Year 1914*, Vol. 1, pp. 127-133. Washington, D. C., 1916. [Decline of the Oriental trade routes in the sixteenth century is to be ascribed to the discovery of the Cape route rather than to the rise of the Ottoman Turks.]

Masterman, E. W. G. **The Jordan Valley and its lakes.** Map, diagrs., ills. *Geogr. Journ.*, Vol. 51, 1918, No. 4, pp. 193-215 (discussion pp. 213-215).

Stefani, Carlo de. **Cenni di geografia fisica sulla Palestina.** Ills. *Boll. Reale Soc. Geogr. Italiana*, Vol. 7, 1918, No. 3-4, pp. 286-294. Rome.

Ward, R. DeC. **Weather controls over the fighting in Mesopotamia, in Palestine, and near the Suez Canal.** *Scientific Monthly*, Vol. 6, 1918, No. 4, pp. 289-304.

Wigram, E. T. A. **The Ashiret highlands of Hakkiari (Mesopotamia).** *Journ. Central Asian Soc.*, Vol. 3, 1916, Parts II-III, pp. 40-59 (discussion pp. 57-59). [London.]

—— ***Palestine.*** [Two sheets: North Sheet, printed with additions and corrections . . . 1916; South Sheet, printed with additions and corrections . . . 1915.] 1:168,960 or ⅜ inch to 1 mile. Geographical Section General Staff [Publ.] No. 2747, War Office, London, 1915-16.

China

Dingle, Edwin John, edit. ***The new atlas and commercial gazetteer of China: A work devoted to its geography & resources and economic & commercial development.*** Containing 25 bi-lingual maps with complete indexes, and many colored graphs. Compiled and translated from the latest and most authoritative surveys and records by the staff of the Far Eastern Geographical Establishment. 2nd edit. North-China Daily News and Herald Ltd., Shanghai, 1918. Taels 90. 22 x 16. [This work is of importance because it reflects familiarity with local conditions. As to railroads it is particularly up to date. The maps which form the bulk of the atlas are of the customary political type, with a wealth of place names. The name of each place is given in Chinese characters and in English transliteration. As regards treatment the maps show a certain weakness and ungeographical interpretation (possibly due to native craftsmanship) which is likewise characteristic of the maps published by the Chinese Maritime Customs.]

AUSTRALASIA AND OCEANIA

Australia, New Zealand

Flockart, D. P., S. W. Addison, H. H. Storrer, and J. Brake. **Meteorology in the flight zone.** *Australian Monthly Weather Rept. & Meteorol. Abstract*, Vol. 4, 1913, No. 7, pp. 371-374. Melbourne, 1917.

Gregory, J. W. **Australia.** 156 pp.; maps, ills., bibliogr., index. (The Cambridge Manuals of Science and Literature.) University Press, Cambridge, and G. P. Putnam's Sons, New York, 1916. 45 cents. 6½ x 5. [About half of this little book is devoted to description or physical conditions and natural resources; the remainder to social and political considerations.]

Gregory, J. W. **The flowing wells of western Queensland.** Maps, diagrs. *Queensland Geogr. Journ.*, Vols. 30-31, 1914-16, No. 16-17, pp. 1-29 (discussion, pp. 23-29). [''One of the main problems of Australian geology'' is concerned with the nature and probable duration of the flowing wells.]

Hamlyn-Harris, R. **Some anthropological considerations of Queensland and the history of its ethnography.** Ills., bibliogr. *Proc. Royal Soc. of Queensland*, Vol. 29, 1917, pp. 4-44. Brisbane.

WORLD AS A WHOLE AND LARGER PARTS

Herbertson, A. J., and O. J. R. Howarth, edits. **The Oxford Survey of the British Empire. Vol. I: General survey, including administration, legal problems, history, defence, education, acclimatization, mapping, commerce, communication, migration.** viii and 386 pp.; **Vol. 6: The British Isles and Mediterranean possessions (Gibraltar, Malta, Cyprus).** xii and 596 pp.; maps, diagrs., ills., index. The Clarendon Press, Oxford, 1914. 14s. each. 9 x 5½.

A useful series, concentrating and in part interpreting the important facts relative o the growth and present status of the British Empire. The first five volumes of the eries deal with the component parts of the Empire classified regionally. Volume 1, devoted to the British Isles, may be taken as an indication of the unusually broad scope of the treatment. Physical and human aspects are discussed in sections each contributed by an authority in the particular aspect. Much condensed information is given, and results of the most recent research are embodied therein. The chapter on climate, by W. G. Kendrew, makes reference to such important but often neglected data as frequency, intensity, and diurnal period of rainfall; the amount and distribution of sunshine; and the frequency and distribution of fog. The evolution of British vegetation, particularly of the forest period, and its decline are discussed by C. E. Moss. The valuable work now being carried on by the British Ethnographical Survey, organized by H. J. Fleure and T. C. James as a part of the activities of the Guild of Graduates of the University of Wales, is utilized in the chapter on races and languages. Nearly a hundred pages are given to discussion of ''life and administration'' under rural and urban conditions, material highly relative to the ultimate geographical problem—the where and why of population distribution. The last chapters, devoted to the islands of the home waters and the Mediterranean, form an interesting group. This sectional treatment, however, suffers somewhat from the defects of its merits. The close interweaving of geographical causes and events is lost. We miss the geographical atmosphere that permeates Mackinder's ''Britain and the British Seas.'' The chapters on agriculture, minerals, production, and trade contain many data for human geography, but no such interpretation as may be found in Mackinder's chapters on metropolitan and industrial England; and despite the wealth of information on the seas and sea fisheries we miss also the feeling of insularity and its effects so strongly impressed by Mackinder.

The sixth volume discusses some of the social and political problems confronting the Empire. It includes sections on administration by Sir Charles P. Lucas and mapping of British territories by Colonel Close—a sufficient indication of the authoritative nature of the series. ''Some Aspects of Imperial Commerce and Communications,'' by O. J. R. Howarth, closes the survey. This last section, while short, is valuable. It is accompanied by a map showing in striking fashion the character of intercolonial commerce, and it calls attention to the important work of the Royal Commission on the natural and economic resources of the Empire.

The volume on Africa was reviewed in the *Review,* Vol. 1, 1916, p. 70; and that on Australasia in Vol. 6, 1918, pp. 380-381.

BUNTING, W. L., AND H. L. COLLEN. **A geography of the British Empire.** viii and 166 pp.; maps, diagrs., ills., indexes. University Press, Cambridge, and G. P. Putnam's Sons, New York, 1916. $1.10. 10 x 7½. [The first edition (1913) was reviewed in the *Review,* Vol. 1, 1916, p. 324. The present second edition is increased by two sections, boundaries in general and in particular of the British Empire.]

—— **Russia, Germany, and Asia. The steppe as a political factor; Russia in Asia: The North-East Passage; Russia in Asia: The South-East Passage; Germany's opportunity; China or India?** Map. *The Round Table,* No. 31, 1918, June, pp. 526-564. London.

—— **Strategic importance, The, of the world's coaling stations.** Ills. *The Americas,* Vol. 4, 1918, No. 5, pp. 7-13.

VERGNES, CH. **Presentation des statistiques du commerce des colonies françaises: Aperçu statistique du mouvement d'exportation des principaux produits des colonies françaises pendant la période décennale 1904-1913.** Diagrs. *Trans. 3rd Internat. Congr. of Tropical Agric. Held at the Imperial Inst., London, June 23-30, 1914,* Vol. 2, pp. 543-585. Internat. Assoc. for Tropical Agric., London, 1917.

MATHEMATICAL GEOGRAPHY

SURVEYING AND GEODESY

ELIOT, M. E. Y. **Tacheometer surveying, with special notes on plotting, care and adjustment of instruments, field work, and calculations.** x and 148 pp.; maps, diagrs. E. & F. N. Spon, Ltd., London, and Spon & Chamberlain, New York, 1916. $2.00. 7½ x 5.

''This book is intended more especially for the information of those future members, or present junior members, of the engineering profession whose work has not yet familiarized them with the tacheometric methods now almost exclusively employed in making engineering surveys in countries other than England.'' The author attempts to ''give such information as to the actual handling of instruments in the field, or the methods adopted for working out calculations in busy offices, as will enable the student to *teach himself* the practice which is based upon theory.'' Certainly in the United States, where transit and stadia and plane table methods have reached such a high stage of development, this book will make little appeal. In addition to the tacheometer and its use, short chapters are devoted to the planimeter and slide rules.

JAMES GORDON STEESE

BOWIE, WILLIAM. **Investigations of gravity and isostasy.** 196 pp.; maps, diagrs., ills., index. *U. S. Coast and Geodetic Survey Serial No. 50.* Washington, D. C., 1917.

BROWN, ERNEST. **Determination of the earth's shape by simultaneous astronomical observations in North and South America.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 271-280 (discussion, pp. 274-280). Washington, D. C., 1917.

GANNETT, S. S. **Geographic tables and formulas.** 4th edit. 388 pp.; diagrs., index. *U. S. Geol. Survey Bull. 650.* Washington, D. C., 1916.

MCCAW, G. T. **Resection in survey.** Diagrs. *Geogr. Journ.,* Vol. 52, 1918, No. 2, pp. 105-126 (discussion, pp. 123-126).

CARTOGRAPHY

BARNES, J. B. **Elements of military sketching and map reading.** 3rd edit., revised. v and 100 pp.; maps, diagrs., ills. D. Van Nostrand Co., New York, 1917. 75 cents. 6 x 4.

In this edition, Captain Barnes has added chapters on map reading and landscape sketching. Of a convenient size to carry in the pocket, this book condenses much valuable practical information into very small compass. The difficult subject of contours is excellently explained and illustrated. The making of a road sketch or a position sketch is explained in detail. In landscape sketching, the system of references and designation of targets in use at the musketry school and adopted for the army is explained.

JAMES GORDON STEESE

GRIEVES, L. C. **Military sketching and map reading.** 95 pp.; maps, diagrs. United States Infantry Assoc., Washington, D. C., 1917. $1.00. 9½ x 6.

This little book is intended by Captain Grieves to meet the requirements of the educational institutions operating under the War Department. It contains ten lessons in map reading and five lessons in military sketching. Each lesson prescribes the means and methods to be employed, and all extraneous matter has been eliminated. Numerous simple problems and illustrations illuminate the text. Instruction in sketching is limited to orthographic projection. Chapter 15 describes in detail different types of topographical reconnaissance reports. In an appendix are given suggestions for instruction at training camps.

JAMES GORDON STEESE

SPALDING, G. R. **Training manual in topography, map reading, and reconnaissance.** 151 pp.; maps, diagrs., ills. Corps of Engineers, U. S. Army, Washington, D. C., 1917.

UNSTEAD, J. F. **How to read ordnance maps: Practical hints for officers. . . . geography classes, student teachers, etc.** 31 pp.; diagrs. George Philip & Son, Ltd., London, 1915. 6d. 7 x 5.

HUMAN GEOGRAPHY

ECONOMIC GEOGRAPHY

Distribution

SCOTT, J. B., edit. **The freedom of the seas or the right which belongs to the Dutch to take part in the East Indian trade: A dissertation by Hugo Grotius.** Translated with a revision of the Latin text of 1633 by Ralph Van Deman Magoffin. xv and 83 pp.; index. (Carnegie Endowment for International Peace, Division of International Law.) Oxford University Press, New York, 1916. $1.00. 10 x 7.

Snow, C. D. **German foreign-trade organization, with supplementary statistical material and extracts from official reports on German methods.** 182 pp. *Bur. of Foreign and Domestic Commerce Misc. Ser. No. 57.* Dept. of Commerce, Washington, D. C., 1917. [See especially the chapter summarizing the development of German merchant shipping.]

HISTORY OF GEOGRAPHY AND EXPLORATION

Pumpelly, Raphael. **My reminiscences.** Vol. 1: xiii and 438 pp., maps, ills.; Vol. 2: xi and pp. 439-844, maps, ills., index. Henry Holt & Co., New York. $7.50. 9 x 6.

These two volumes are a worthy memorial of more than eighty years of crowded career. From any one of many points of view they deserve honorable space on our shelf; whether as geologist or geographer, as archeologist or diplomat, or as scholarly traveler, Pumpelly is interesting. With a precocity and persistence worthy of Edison or Franklin, he noted geological features of Corsica when most lads would be spending summer holidays on tennis courts. As early as 1860 he was fighting Apaches and Mexicans in the intervals of a mining tour on our southwestern frontier. Next year the Japanese government called upon him for a report on the mineral wealth of their country, and he relates his political, social, and scientific experiences in that interesting period preceding the advent of the new régime in 1868. He makes a narrative unique in historic value, for, while E. S. Morse, who went to Japan in 1877, had official position, Pumpelly traveled as might have traveled a favored *samurai* in the days of Taiko Sama.

China was also opened to him by Imperial favor. Memorable among his journeys was that to the upper waters of the Yangtze when the Taiping Rebellion was still smoldering. Whilst the training of a scientific recorder forbids latitude in the expression of political opinions, it is worthy of note that in the matter of our relations with China and Japan the author stood almost alone in supporting the view that our policy should be that of the broadest generosity in cultivating the good will of those two great countries.

In 1903-04, when approaching man's allotted term of years, he undertook what he describes as the most interesting part of his life, an expedition to Central Asia. Less stirring perhaps but no less important are the records of services at home—on the Geological Survey, on the Northern Transcontinental Survey, and in the exploration of mineral resources in various parts of the country.

What the author has done has been well done. Like other brave men who served science at the risk of their lives he has told his story simply, honestly, and therefore effectively. It has been read with grateful pleasure. Poultney Bigelow

Brunhes, Jean. **La géographie de l'histoire.** Ills. *Rev. de Géogr. Annuelle,* Vol. 8, 1914-15, pp. 1-71. Paris. [Abstracted in the *Review,* Vol. 2, 1916, p. 234.]

Davenport, F. G., edit. **European treaties bearing on the history of the United States and its dependencies to 1648.** vi and 387 pp.; index. *Carnegie Institution Publication No. 254.* Washington, D. C., 1917. 10 x 6½. [The forty documents (some appearing in print for the first time) here brought together illustrate the diplomatic aspect of the struggle among the maritime powers of Europe for trade and territorial possession in the New World from its discovery to 1648, date of the Treaty of Westphalia. To clarify the history of the conflicting claims between the first contestants, Spain and Portugal, documents prior to the former date are included, the volume opening with the papal bulls of 1455 and 1456 which gave Portugal exclusive rights in the region south of Cape Bojador, through and beyond Guinea. The volume concludes with the Treaty of Münster between Spain and the Netherlands, wherein the Iberian power first publicly acknowledged the rights of other nations in the Indies. In the case of each document, text and translation are given, preceded by introduction and bibliography.]

Mackie, G. B. **Geography in relation to war.** Diagrs. *Scottish Geogr. Mag.,* Vol. 33, 1917, No. 11, pp. 498-507. [The author claims that "geography, including therein the cognate parts of the sciences from which it borrows, has more military significance than all other branches of standard curricula taken together" and urges the adequate recognition of geography in education. He illustrates his thesis by examples showing the importance of map reading and of the interpretation of physical facts.]

THE
GEOGRAPHICAL REVIEW

VOL. VII FEBRUARY, 1919 No. 2

FAIRS OF THE CENTRAL ANDES

By G. M. WRIGLEY

In the general conception of commerce as competition we lose sight of its fundamentally unifying character. Man first knew peace through commerce. Intertribal hostilities were suspended for trade.

> We can trace on both sides of the Aegean Sea the origin of intercommunication between tribes, and of mutual commerce, conducted at first through markets common to two or more tribes, in which for the moment all met under the protection and guardianship of the god. The advantage of all the tribes was served by this religious guarantee for the life of traders and the safety of goods at the market. Lines of communication became roads across land and sea, and the annual market became an annual festival which attracted far more than mere traders.[1]

Among savage tribes the same tentative movement towards peace may be seen today. Stanley describes market places on the banks of the Congo as being "central resorts of the aborigines from either bank, and considered as neutral ground, which no chief may claim, nor any individual assert claims or tribute for its use."[2]

VARIOUS KINDS OF FAIRS

It is with a form of trade particularly identified with peaceful movement that we are here concerned, i. e. the fair. The picturesque word "fair" is likely to suggest various conceptions. We may think of our present-day domestic "fairs" from the county variety to the great world exposition. Attention has recently been called to the fairs that the French have initiated with such success in their North African colonies. If we follow the trends of modern business we may think of a type of fair that has sprung into prominence since the beginning of the war, with its dislocations of commercial movement. This type is illustrated by the Swedish market fair held last year (1918) at Göteborg and by the fair of Utrecht. The best

---

[1] W. M. Ramsay: Presidential Address to the Geographical Association, *Geogr. Teacher,* No. 50, Vol. 9, Spring, 1918, pp. 175-180; reference on p. 180.

[2] H. M. Stanley: Through the Dark Continent, 2 vols., New York, 1878; reference in Vol. 2, p. 167.

Copyright, 1919, by the American Geographical Society of New York

known of these new fairs, however, is the fair of Lyons. The first fair, held in 1916, was described by the promoters as "neither an exhibition nor a market . . . not so much the display and sale of goods as the bringing together of actual manufacturers and buyers."[3]

All these, though descendants of the traditional fair, are developments along special lines from the fair as a mode of general commerce; but before passing on to the traditional fair let us note the special significance of the prominence of Lyons in the new movement. Lyons owes its commercial importance especially to its situation.[4] Not only is it a confluence town, it is at the contact of many regions, some of which extend beyond French territory. Lyons is distinguished as a point of international transit. The situation exercised a similar influence five hundred years ago, when the fairs of Lyons, successful rivals of the even more famous fairs of Champagne, were a center of attraction for Europe. That was the heroic age of the fair. Primarily it arose from the extreme difficulties of transportation—poor roads, slowness of travel, heavy tolls *en route,* insecurity. At the same time the social and governmental organizations of the times were induced to promote and protect this means of trade for the substantial revenues accruing from it. The fair stands out as a highly characteristic feature of a "middle" stage of commercial development. In Western Europe it flourished in the Middle Ages. With the great world discoveries, the beginning of truly international trade, and improvement in means of transportation it gradually declined.

Transportation and the Fair

The relation between transportation and the fair is everywhere clear. The English North Country fairs declined most rapidly after 1759, when good roads had been constructed and canal communication established between Liverpool and the towns of Yorkshire, Lancashire, and Cheshire. The lingering of the fair system in Eastern Europe is in accord with the retention of primitive means of communication. The fair of Leipzig is an interesting example. It flourished during the eighteenth century because the evolution of means of communication in this region towards the eastern and less-developed parts of Europe was less rapid than the growth of Saxony's industries. Through the nineteenth century and to the present day, however, the fair has survived only by changing its character; it is now a fair of "samples."[5] Russia still remains a country of the old-time fairs. In 1882, when a special tax was imposed on the holding of fairs, their number was placed at 2,500. They comprised the great fair of Nizhni Novgorod; 47 fairs lasting over twenty-one days; 59 lasting from fifteen to twenty days; 291 from eight to fourteen days; and the remainder under seven days. By far the greater number were held in the eastern region, and in recent years no new fairs have been created save that of Baku, in 1886, and some in Siberia and Russian Central Asia.[6] The trade of the Nizhni Novgorod fair reached a maximum in 1882. Its decline has been concomitant with the opening of new railroads in the east.[7]

---

[3] *Ann. de Géogr.*, No. 136, Vol. 25, 1916, pp. 303-306.

[4] Raoul Blanchard: Trois grandes villes du sud-est (Lyon, Marseille, Nice), *Recueil des Trav. de Inst. de Géogr. Alpine* (*Grenoble*), Vol. 6, 1918, pp. 153-210.

[5] L. Arqué: La foire de Leipsic dans les temps passés, *La Science Sociale*, May, 1910; *Idem:* La foire de Leipsic à l'epoque actuelle, *ibid.*, June, 1910.

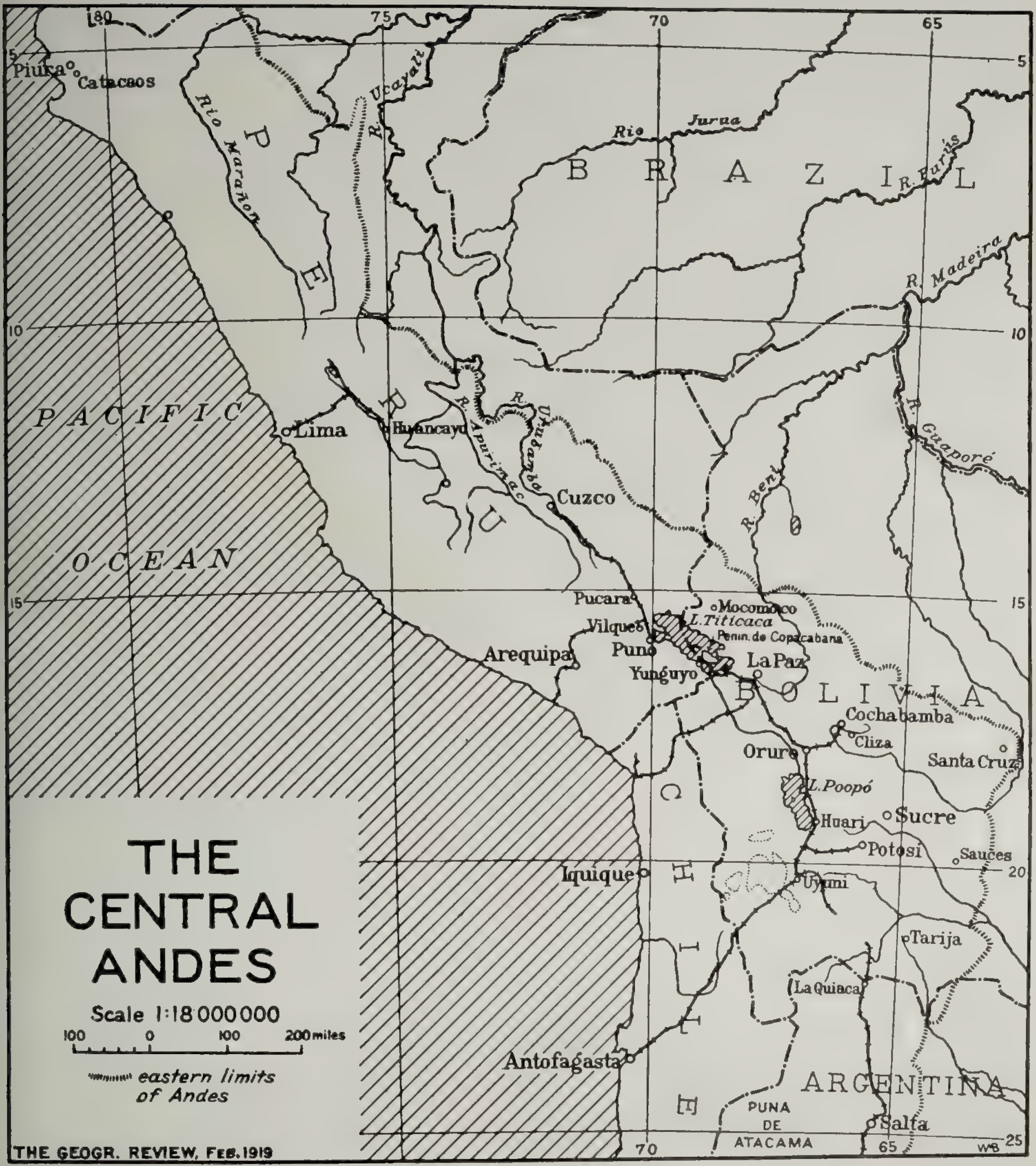


FIG. 1—Location map of the Central Andes showing towns whose fairs are mentioned in the text. The map also shows railroads on the plateau; the short coast railroads of Peru and the nitrate railroads of northern Chile are not shown. Scale, 1:18,000,000.

In the Western world fairs still account for most of the commercial movement over a large section of South America. In many a small Peruvian

---

[6] For an illustration of the fair at Semipalatinsk see *Russia* (published by R. Martens & Co., New York) Vol. 3, 1918, No. 4, p. 24.

[7] See also the note on Russian fairs in the *Geogr. Rev.*, Vol. 2, 1916, pp. 154-155.

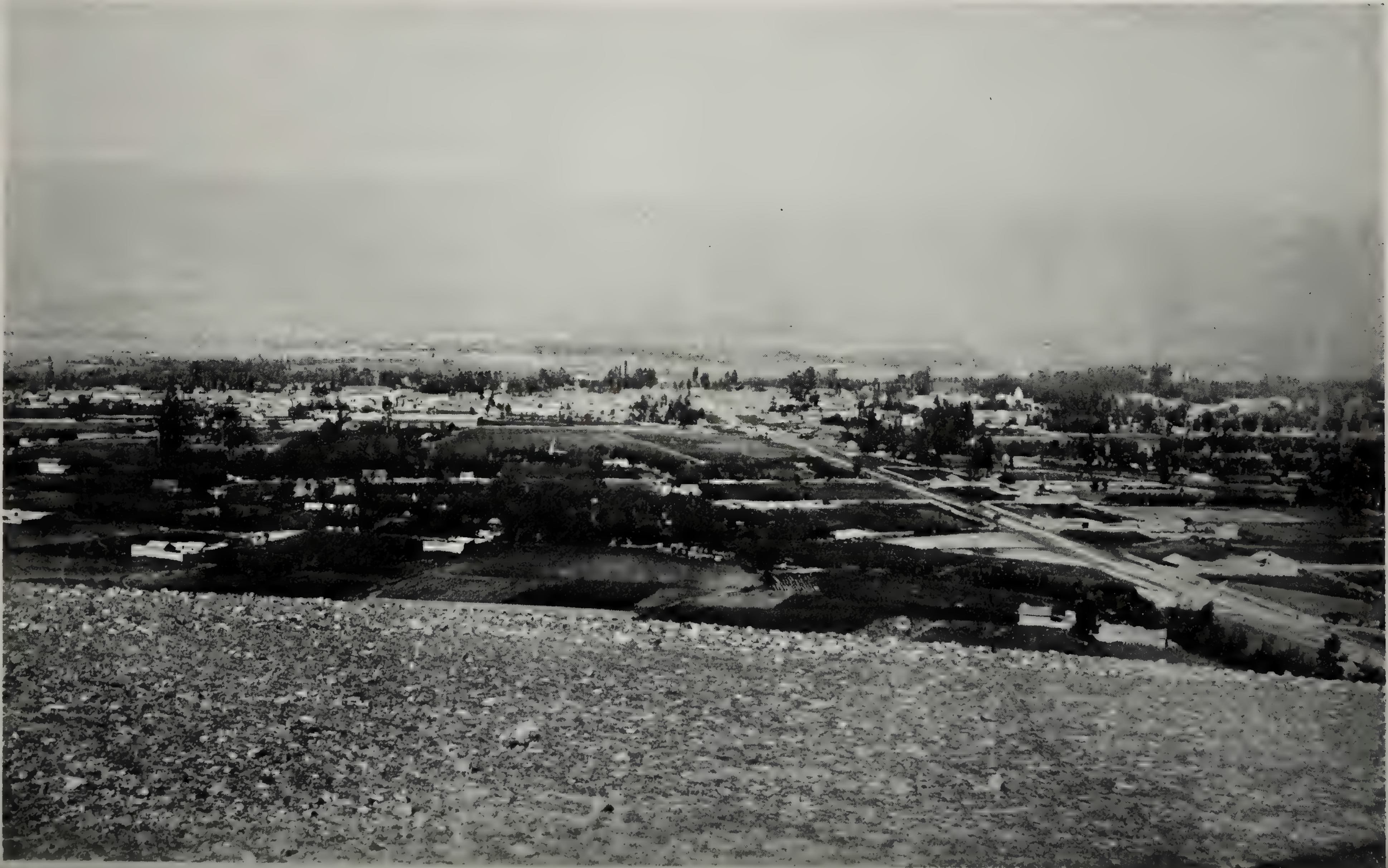


FIG. 2– Panoramic view of Huancayo. Huancayo is typical of many favorably situated towns in the upper valley region (*cabecera de valle*) of the eastern

or Bolivian town the traveler will encounter a weekly Sunday morning market that is a veritable revelation. The larger annual fairs are also memorable sights.

THE HUARI FAIR

The Huari fair is probably the best example of the great annual fairs of the Central Andes. Huari is one of a number of small settlements marking the edge of the gently sloping piedmont that fringes the descent of the eastern Andes to the *altiplano.* Challapata, a few miles from Huari, is a meeting point of routes: here unite important roads from Oruro, Sucre, Potosí, and Uyuni. During the great part of the year Huari leads a desolate and monotonous existence, but for the fortnight succeeding Holy Week the transformation is complete. Huari is a busy mart; a gathering of 10,000 people is not unusual. As the district can supply few resources save pasture, somewhat elaborate preparations have to be made for the accommodation of the fair. The fair is under municipal control (Challapata); but, as is customary in Bolivia, the collection of the fair taxes and with it the general conduct of the fair are put up at auction. In 1907 the rights were bought by a merchant now residing at Copiapó.[8] From his ledger come interesting figures of the character of the fair. The rights were bought for $3,800, and the sum of nearly $8,000 was realized. Amongst the details of the taxes appear those on 53 shops—they exist during the fair only, of course—at $10 each; 114 tents at $5; 2 hotels at $50; 25 boarding houses at $10; 4 general merchandise stores at $50; 29 shops for coca at $5; 67 saloons at $20; 31 gaming tables at $20; and 1 roulette table at $500. The 6,490 horses, mules, bullocks, and donkeys paid an impost of 30 cents each. Five employees collected the dues. Order was maintained by 25 soldiers authorized by the government under the sub-prefect, whilst at night further protection was guaranteed by 200 Indians patrolling in bands of 50. On this occasion between 7,000 and 8,000 people attended the fair, the greatest number in the "rush" period of the first days. The visitors to the fair are drawn from a wide area and bring with them a great diversity of products. From the Argentine *pampas* by way of Salta and La Quiaca come mules, donkeys, bullocks, leather goods. More beasts that have been fattening during the preceding summer in the alfalfa meadows of the high valleys of Los Andes come over the Puna de Atacama. And today those not salable in the nitrate fields are likewise taken to Huari. Grain comes from Tupiza and Sucre and other upper valley regions; wine from Cinti; fruit and coca from the warmer valleys, such as Mizque; sugar, rice, brandy from Santa Cruz. From the *altiplano* itself come woolen fabrics, wrought silver, *chuño* (the frozen potato), and vicuña and chinchilla skins from the desolate region of Lipez, southern Bolivia. Trade in the last-named article, diminished today, has long constituted one of the leading features of the Huari fair. The larger towns—La Paz, Oruro, Potosí—send European goods. Southward, where the influence of the fair extends for the greatest distance, its attraction is felt at least 500 miles ''as the condor flies.''

---

[8] The data from this enterprising merchant, C. J. Bosman, were secured by Bowman in his expedition to the Central Andes, 1913.

THE HUANCAYO FAIR

Not greatly dissimilar save for their smaller scale and more local influence are the weekly fairs. The Cliza fair, which is typical, has been described by Bowman.[9] Cliza is situated in one of the several semi-arid, well-irrigated, and carefully cultivated basins that characterize the densely peopled part of the province of Cochabamba. The elevation, 9,000 feet, favors the growth of grain, vegetables, and fodder, while the location is convenient as a meeting point for other products from the zones above and below—potatoes and pastoral products from the *puna,* tropical products from the lower valleys.

Perhaps the most famous fair of this type in the entire Andean region is the Huancayo fair of central Peru.[10] The location of the town and the features of the fair are largely identical with those of Cliza. Huancayo at 10,500 feet in the upper Jauja Valley also occupies a site on the alluvial floor of a basin in the ''upper valley'' zone (Fig. 2). Around the town are fields of maize, wheat, barley, and alfalfa; down the proverbially beautiful and fertile valley are sugar, coffee, and coca plantations and the hundred products of the *montaña.* Five leagues above the town to the east the crest of the Cordillera de Huaritanga is crossed by a pass 15,300 feet above sea level. Every Saturday mule trains stream in with the agricultural produce of the surrounding district. On Sunday the local products are sold, together with European goods brought from Lima. Though the fair is not in as flourishing a condition as in former days yet it attracts a number of people from the adjacent provinces. Between 10,000 and 12,000 Indians are said to congregate at these weekly gatherings.

The two systems of weekly and annual fairs represented by the foregoing examples are close counterparts of the medieval fairs of Europe. They exhibit all the characteristics of the fair as a vehicle of trade in the ''middle'' stage of development. The essential features are the variety of products introduced; the periodic character of their assemblage, with feverish activity during the operation of the fair, preceded and followed by almost complete suspension of trade; and the great individual movements involved.

The Weekly Fair

The weekly type of fair, more purely commercial and less complex in origin, will be discussed first. This type presupposes a fairly advanced stage of industry along a number of special lines and a fairly numerous rural population. Where such a form of trade is prominent capital is lacking, and usually trading by barter is not unknown, for the circulation of specie is apt to be limited. An interesting example of barter amongst the Indian population is noted by Raimondi. In the latter part of the last century he found the earthenware storage and cooking vessels (*ollas*) made in Junin exchanged against the measure of wheat they could hold.[11] The fair is a method of trading where costs of distribution are at a minimum; it is appropriate to a stage where capital and commercial security are lacking and where the costs of transportation are already so heavy that they can stand no further strain.

---

[9] Isaiah Bowman: The Highland Dweller of Bolivia, *Bull. Geogr. Soc. of Philadelphia,* Vol. 7, 1909, pp. 159-184.

[10] *Bol. Soc. Geogr. de Lima,* Vol. 2, 1893, p. 345, and Recurso Minerales de Jauja y Huancayo, *Bol. del Cuerpo de Ingenieros de Minas del Perú, No. 35,* Lima, 1906, pp. 10-31.

ITS ANCIENT ORIGIN

The foundation of the market held at short intervals is ancient in the Central Andean countries, for here arose an early development of problems of distribution. The Inca Empire was essentially built on an agricultural basis. The Peruvians domesticated a greater number of different plants than any other people of America.[12] The "fixed varieties of climate" occurring in limited distances also encouraged the production of an extraordinarily great number of varieties of the same species. This is especially true of the chief food crops, maize and potatoes, for instance. Peruvian maize has a unique altitudinal range: it is grown at all altitudes from 13,000 feet around Lake Titicaca to the tropical plains. The scant areas of cultivable land in the *altiplano* and upper valleys confirmed the policy of agricultural colonization in conquered areas. The *mitimaes*, involuntary colonists, were despatched to newly conquered territories as much for agricultural as for political ends.[13] To the new locations they carried the products and methods of their native home.

Dwellers in the more cold and sterile *altiplano* were allotted lands in the neighboring hot valleys of *montaña* or coast. The local chiefs (*caciques*) were permitted to send their people thither to gather the harvest and bring it home. Furthermore, contrary to the usual rigid rule, a certain number of families were allowed to reside in the valleys and care for the farms (*chacras*) the year round while remaining subject to their own *caciques*. Theocratic rule and "communal" organization of this essentially agricultural civilization made easy a well-regulated distribution of products. With some of the features of distribution, such as the system of communal granaries, we are well acquainted. Of the details we know little. Apparently there was no development of the market on such a scale as the Spaniards found in Mexico, a country similarly endowed with a wealth of products of a character to allow the early stimulation of exchange.

---

[11] Antonio Raimondi: El Departamento de Ancachs, Lima, 1873.

[12] O. F. Cook: Staircase Farms of the Ancients, *Natl. Geogr. Mag.*, Vol. 29, 1916, pp. 474-534.

[13] P. B. Cobo: Historia del Nuevo Mundo (1653), 4 vols., Seville, 1890-95; reference in Vol. 3, pp. 222-226.

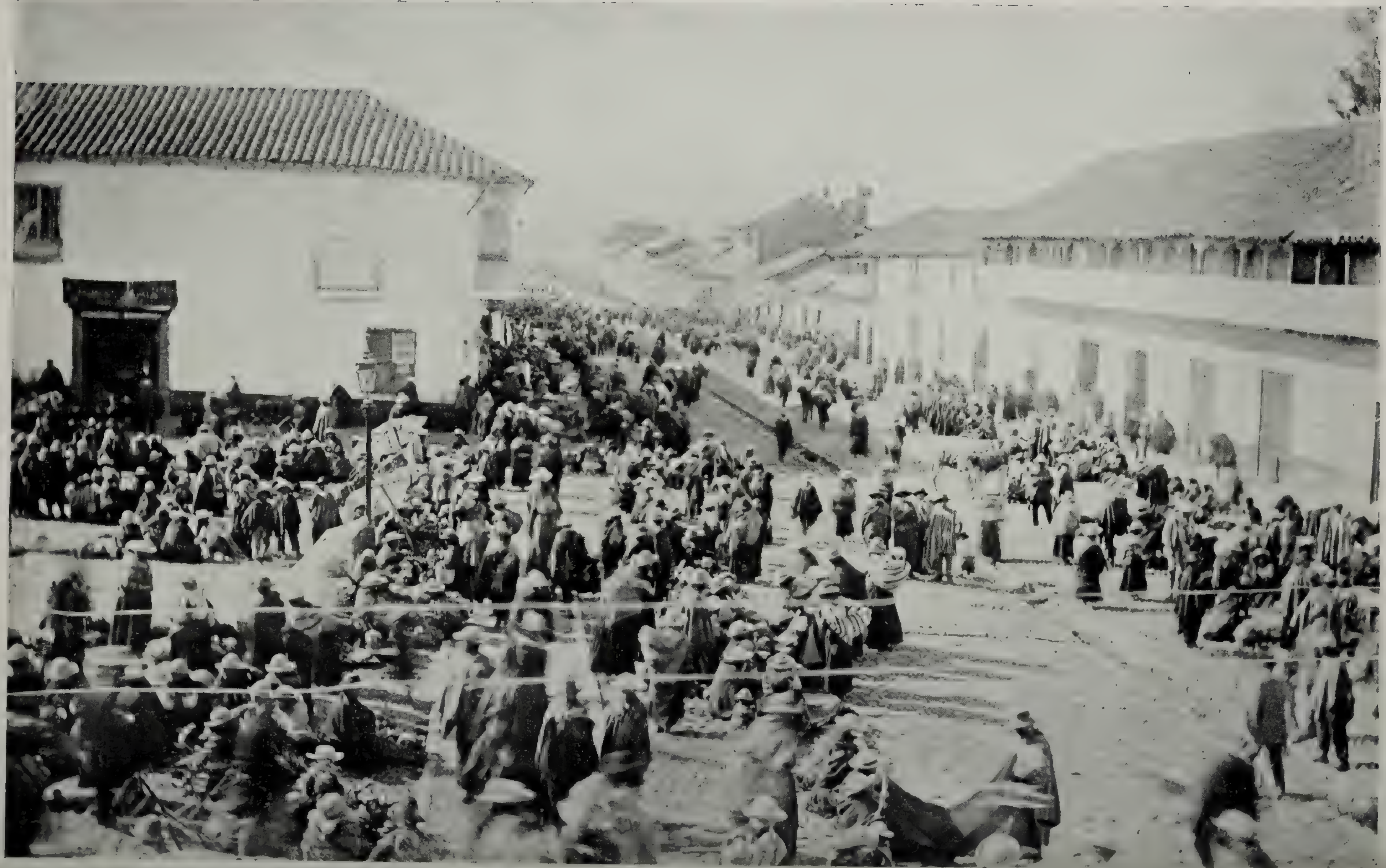


FIG. 3—The Sunday fair in Huancayo. Huancayo was formerly the market for all the country between Cerro de Pasco and

MEXICAN FAIRS VERSUS PERUVIAN

The Mexican fairs astounded the Spanish pioneers by their wonderful resemblance to the fairs of their native land—to those of Salamanca and Granada. The fair of Mexico City, held every fifth day, is said to have been attended by 40,000 to 50,000 people. The organization for the maintenance of peace and the summary courts of justice closely recall those of the medieval European fairs. While exchange was usually by barter, certain forms of currency—stamped tin and quills of gold dust—were also employed.[14] We have no description of anything like this in Peru. Cieza de León, writing in 1550, says: "In all parts of this kingdom of Peru we who have travelled over it know that there are great fairs or markets, where the natives make their bargains. Among these the greatest and richest was formerly in the city of Cuzco. . . . But this market or fair at Cuzco did not equal the superb one at Potosí, where the traffic was so great that, among the Indians alone, without including Christians, twenty-five or thirty thousand *pesos* exchanged hands daily."[15] But no details of the markets as found by the Spaniards are given.

TWOFOLD FUNCTION OF THE MARKET

Garcilaso de la Vega, quoting from the laws of the Inca Pachacutec given by Father Blas Valera, says: "In order that labour might not be so continuous as to become oppressive, the Ynca ordained that there should be three holidays every month, in which the people should divert themselves with various games. He also commanded that there should be three fairs every month, when the labourers in the field should come to the market and hear anything that the Ynca or his council might have ordained. They called these assemblies *Catu*, and they took place on the holidays."[16] This double function of the market suggests that of the Roman market in the Forum, held approximately at the same interval (every nine days). That the market was a regular establishment before the coming of the Spaniards seems to be indicated by the numerous ordinances of Francisco de Toledo (Viceroy of Peru from 1569 to 1581), referring to the native market (*mercado* or *tianquez*—the Mexican form—elsewhere referred to as the Quechua *catto* or *cattu*). The freedom these ordinances were wisely designed to give the Indian under the superintendence of his own *cacique* is in line with the viceroy's general recognition of the appropriateness of several native customs. Another instance of this recognition is his attempt to re-establish the communal granary (*pirua*).

---

[14] W. H Prescott: History of the Conquest of Mexico, 3 vols., New York, 1848; reference in Vol. 2, p. 140.

[15] The Travels of Pedro de Cieza de León, *Hakluyt Soc. Publs.*, 1st Ser., Vol. 33, London, 1864, pp. 390-391. A good description of the daily market that supplied this city of some 100,000 people is described in the "Relaciones Geográficas de Indias," Madrid, 1881, Vol. 2, p. 78.

[16] The Royal Commentaries of the Yncas, *Hakluyt Soc. Publs.*, 1st Ser., Vol. 45, London, 1871, p. 206. Cieza de León also says that in Inca times the miners had "provision to rest for certain days in each month, for their festivals and for pleasure" (Second Part of the Chronicle of Peru, *Hakluyt Soc. Publs.*, 1st Ser., Vol. 68, London, 1883, p. 53).

The Annual Fair

The history of the annual fair is more complex. Every Peruvian and Bolivian town has its annual fair, but the number of big fairs is limited. Some of the fairs and the dates on which they are held are: Huari (week after Easter); Vilque (Whitsuntide); Yunguyo (August); Sauces (August); Mocomoco (September); La Quiaca (October). The seasonal distribution is marked. Most fairs take place at the changes of the seasons—rainy and dry. None of any importance, so far as is known, is held in the months of January, February, or March, the height of the rainy season. The relation of the fair to seasonal activity is the feature that distinguishes it from the market or weekly fair.

SEASONAL AND RELIGIOUS ORIGIN

The war has called the attention of the individual back to nature, but under normal conditions of modern civilization the city dweller loses appreciation of and reverence for the seasonal processes of nature. If the East Anglian wheat fields fail, the Londoner is not greatly concerned; his existence is not imperiled thereby, for the North American prairies, the Argentine *pampas,* the Russian ''black lands,'' the irrigated fields of the Punjab, the growing wheatlands of Australia, may supply his bread. It is those people whose entire life is bounded by agriculture that do not forget the import of seedtime and harvest. By them the critical seasons of germination and maturity receive due spiritual recognition; for them the times of prayer and praise, of Easter and Thanksgiving, have a profound significance. In the history of civilization these functions have constituted a vastly important factor of progress. The ceremonials involved have brought together the scattered members of the agricultural community. In ancient Greece the Olympic games, held in the autumn, drew together Hellenes from each individual state. The bringing together of such vast concourses of people had economic and social effects. Most obviously it led to the accumulation in one place of goods of varied character brought from far distant regions; interchange was inevitable; a commercial movement rose of necessity. The fair (Latin *feria,* a holiday; related to *festum,* a feast), primarily of a religious character, assumed more and more a mercantile function. The unique opportunity with its guarantee of freedom and safety acted as a powerful stimulus on trade. It culminated in Europe in the great trading fairs of the Middle Ages.

FESTIVALS IN ANCIENT PERU

In agricultural Peru the Spaniards found an elaborate system of festivals; but under the rigid social and economic organization no prominent commercial features appear to have developed. The distribution of the festivals may readily be conceived.[17] In April crops were reaped and harvested, and in this and the succeeding month were held ceremonies of celebration, including in mid-May the great Festival of the Sun. In July, the month for sowing, another feast was held. In August, when the first rains were due, came the second great feast, the Situa. Local festivals were held in September and October, and in November came the third and last great feast of the year, that of the Inca. During January, February, and March, the height of the rainy season, no celebration took place: as Molina says, the people "did not do anything but attend to their farms."

---

[17] Christóval de Molina: The Fables and Rites of the Yncas, *Hakluyt Soc. Publs.*, 1st Ser., Vol. 48, London, 1873, pp. 3-64.

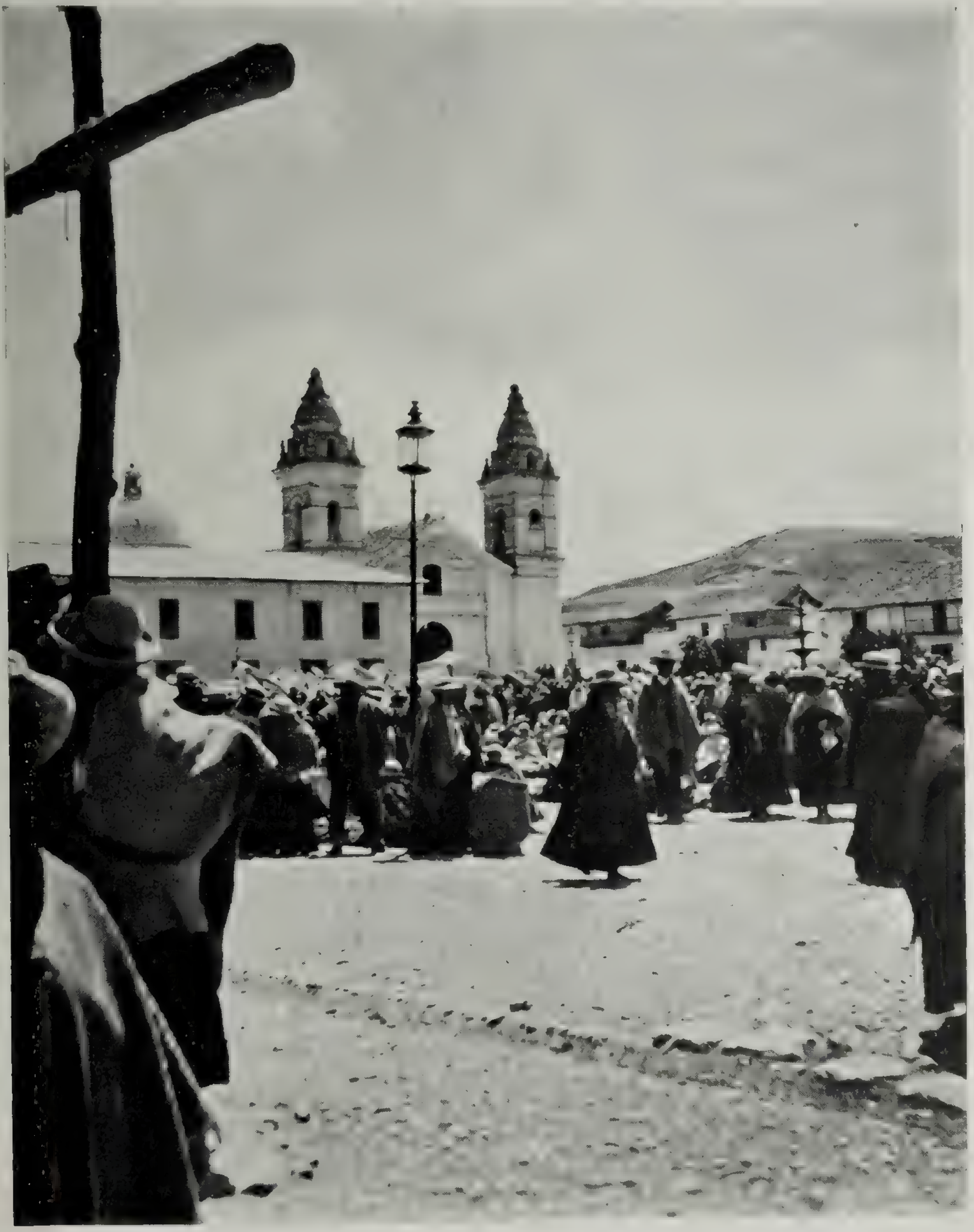


FIG. 4—The plaza of Jauja during the Sunday fair. Jauja is 30 miles from Huancayo, up the valley: its Sunday market now enters into competition with that of Huancayo. (Photo reproduced by permission from *Bol. del Cuerpo de Ingenieros de Minas del Perú, No. 35*, Lima, 1906.)

Christian Ritual and Pagan Festival

The arrival of the Spaniards broke up the well-organized system of economy and introduced new problems of distribution, especially in relation to the mines. Besides the development of the mines, the primary object of conquest, the Spaniards were concerned with the conversion of the Indian. The system of fairs offered assistance in the solution of both problems. The fathers of the Church soon recognized that the new religion must be grafted on the old. They followed the advice of Pope Gregory to the missioners in Britain. ''After due consideration of the habits of the English nation, that because they have been used to slaughter many oxen in their sacrifices to devils, some solemnity must be provided for them in substitution for their ancient festivals. Therefore let them continue to have their sacrifices, but let them be on the anniversary of the dedication of those buildings which have been turned from pagan temples into Christian churches. Then let them build themselves booths of the boughs of trees about those churches as of yore and no more offer beasts to the devil, but rather kill and eat cattle to the praise of God. It is impossible to efface everything at once from their obstinate minds; he who tries to rise to the highest places rises by degrees and not by leaps.''[18] In Peru the shrine of Our Lady of Copacabana was erected in the place most sacred to the Indian, the traditional place of origin of the Children of the Sun. Even today Copacabana preserves the primary religious character in its famous six-day fair.[19] Coincidence of the Christian and pagan festivals—with reversal of the seasonal functions—assisted the designs of the clergy. Corpus Christi, falling about the end of May, coincides with the *chuño* festival of the *altiplano*.

Other Aspects of the Fair

The motive of the clergy, however, was not purely disinterested. Many of the European fairs owed their development to the substantial benefits found to accrue to the Church from the revenues received. The case of the important old English fair of Stourbridge is matched in Peru by the Vilque fair, promoted by the Jesuits who owned the neighboring *hacienda* of Yanarico, famous for its great herds of sheep.

The festivals, by bringing the people together, soon developed new functions. They created opportunities for the civil government as well as for the Church. In the Anglo-Saxon fairs courts of appeal relative to taxation, etc., had grown out of the Easter and Michaelmas gatherings. After the Statute of Laborers had introduced free labor, the fairs, especially the Michaelmas fair, became the principal hiring grounds. In Peru the Indians brought together at the fairs were assessed for tribute; and, although free labor was rare, Cieza de León speaks of the Yanaconas offering themselves for service at the fairs of Potosí.[20] The fairs have been recruiting grounds. In Copiapó fairs were held in October, November, and December. At the last, which coincided with the Feast of the Nativity, the attendance of great numbers of people offered excellent opportunities for the enrollment of companies of militia.

---

[18] Letter of Pope Gregory, A.D. 601, quoted by Austin: Origin of Markets and Fairs .... *Home Counties Mag.*, Vol. 14, 1912.

[19] Copacabana also has an important weekly market. The Indians go there to pray and to sell their produce at the Sunday fair. See A. F. Bandelier: The Islands of Titicaca and Koati, New York, 1910, p. 92

Some fairs long retained their religious character. They are the ones that on account of season or place offered less advantages for trading. Such is the Feast of the Virgin of Andacollo.[21] This festival, held at Christmas, had a rather characteristically superstitious origin. Tradition has it that some time towards the end of the seventeenth century an Indian woodcutter found in the neighborhood of Andacollo, Coquimbo province, an image of the Virgin and Child concealed in a tree. Presumably the image had been deposited there by refugees from the sack of Serena in 1549. A sanctuary was established and richly endowed. Long pilgrimages, many of them from Argentina, were made on the occasion of the feast. Chouteau, writing three decades ago, said[22] it was attended by 20,000 people.

Early Connection with Trade and Transportation

Most of the big fairs, however, early showed relations to trade. Trading by fairs was a method to which the Spaniards were accustomed. Furthermore, it was encouraged from outside by the long continuance of the fleet and galleon system. The flotilla that left Callao in May or June for Panama carried produce gathered in the harvest fairs. This included not only the vegetal fruits of the earth but the annual crop of gold, for the seasonal activity in gold mining was clearly marked; the rainy season produced the golden harvest gathered from the rivers. In the villages about Sorata, one of the principal gold-producing centers of colonial Peru, were held annual *rescate de oro,* as indeed they are still held today. The vessels returning from Panama with European merchandise arrived in time for the fairs held about the end of the rainy season. Again, the fairs were related to the seasonal character of transportation. The poor roads, especially those of the eastern plateau section, are impassable during the season of rains.

Location of the Commercial Fairs

While every town has its annual fair, usually on the day of its patron saint, the number of fairs great because of their commercial movement has always been limited and shows well the influence of geographical control. These fairs were located at some equating point for the movement of products and people. There were several in the Titicaca Basin between the Peruvian valleys and the Argentine *pampas,* the rich valleys of the *montaña*

Cieza de León, work cited in footnote 13, p. 391.

[21] Jullien Mellet: Voyages dans l'intérieur de l'Amérique méridionale, Paris, 1824, p. 82.

[22] Chouteau: Provincia de Coquimbo, Santiago, 1887, pp. 30-34.

and the coast ports whence come the European goods. The fair of Vilque today abandoned but once the most famous of all Peru, is a good example Vilque is a sad little town on the desolate *puna*, six leagues west of Puno the port of Titicaca. During the greater part of the year the chance traveler found the place practically destitute of resources, but at Whitsuntide![2] "Outside the town there were thousands of mules from Tucumán; . . in the plaza were booths full of every description of Manchester and Birmingham goods; in more retired places were gold dust and coffee from Caravaya, silver from the mines, bark and chocolate from Bolivia, Germans with glassware and woolen knitted work, French modistes, Italians, Quechua and Aymara Indians . . ."[24] Alpaca wool and cinchona were other important articles of sale. The number of people assembled has been stated at 15,000.[25] Pucara, "one hundred mud huts set down in the silence of the Pampa" of Puno, was also during one fortnight of the year transformed into "a commercial and industrial Babel."[26] So was Yunguyo on the shores of Titicaca.

Fairs in Transition Zones

Other equating points are found on the borders of well-marked natural regions. The transition or frontier zone between natural regions is in general a zone of meeting and of markets. No better illustration of the development of commerce at such a point can be found than the great Russian fair of Nizhni Novgorod, on the debated ground between Slav and Tatar, between West and East, between forest and steppe. In South America we find instances of fairs located in such transition zones in La Quiaca on the upper edge of the Eastern Cordillera and Salta[27] at the foot. La Quiaca, on a political frontier, has an important fair, held in October. The fair, called by the natives *la Manca fiesta* or "the feast of pots" (*ollas*), lasts for a week and is said to be no less stimulating to international confraternity than to commerce. Miners of the plateau, grain merchants from the delightful valleys of Tupiza and Tarija, cattle men from Argentina are here in numbers equaled by the conjurors and troubadours, quack-doctors and acrobats who keep alive the social side of the fair. A recent report describes the La Quiaca fair as one of the important wool markets of Bolivia and suggests it as a good place for the establishment of an American purchasing agency.[28] Much more local in character is the fair of Sauces on the edge of the populated portion of Bolivia.[29] Sauces is in the lower valley region of Chuquisaca, having a

---

[23] Antonio Raimondi: El Perú, 4 vols., Lima, 1874-79; reference in Vol. 1, p. 173.

[24] Markham: Travels in Peru and India, London, 1862, pp. 93, 284.

[25] Modesto Basadre: Puno, *Bol. Soc. Geogr. de Lima*, Vol. 3, 1894, p. 221.

[26] Paul Marcoy: Travels in South America, 2 vols., New York, 1875; reference in Vol. 1, p. 108.

[27] See an article by the writer, "Salta, an Early Commercial Center of Argentina," *Geogr. Rev.*, Vol. 2 1916, pp. 116-133.

[28] *Commerce Repts.*, 1916, No. 204, p. 803, Bureau of Foreign and Domestic Commerce, U. S. Dept. of Commerce, Washington, D. C.

[29] A. Thouar: Explorations dans l'Amérique du Sud, Paris, 1891, p. 249.

climate hot and unhealthful but possessing in its extensive and fertile prairies a resource—pasture—important in the selection of the site for a fair. As the movement of goods to a fair is accomplished chiefly by animal locomotion, the question of fodder is highly important in this respect. The Stourbridge fair, already referred to, one of the greatest of its day, took advantage of the broad Cambridgeshire meadows. The Huari fair thrives on its pastures of the *puna*.

Present Conditions

Today the great fairs all show a decline; some of those held in the Titicaca Basin towns have been completely abandoned. That the Huari and La Quiaca fairs still show a very considerable trade is due in part to the nature of their fairs. Fairs of the pastoral order always survive in their original form for the longest period: the beasts can be walked to market. Yet in spite of the decline, the fairs and the weekly markets, especially of he eastern valley zones, where the railway is only just penetrating, are of dominant commercial importance. And they must continue so while the mule and llama caravans account for so large a proportion of the traffic. At the beginning of the present century Bolivia had only 350 miles of railroad. In 1912 the mileage had been increased to 800; that is one mile of railroad to 700 square miles of territory. At the same time the United States had one mile of railroad to 8 square miles of territory and the United Kingdom one to 5. The Bolivian highroads amount to not much more than 2,000 miles; and, though Bolivia in her eastern rivers is estimated to possess 6,000 miles of waterways navigable by vessels of four to ix feet draft, obstacles have long stood in the way of development.

Conditions in Peru are not much superior, nor indeed are they in the greater part of the South American continent. This seems an opportunity o point a moral.

Relation to North American Commerce

These four years of war have more than doubled our trade with South America ($801,000,000 for the fiscal year ending June 30, 1917, as compared with $364,000,000 for the year ending June 30, 1913).[30] The business man of the North sees the opportunities that he had previously missed, but there is a danger that he will go to the other extreme and now see more han exist. We have had and should continue to have unusual chance for he promotion of South American trade, but it is no El Dorado that merely waits our taking. G. B. Roorbach in a recent paper[31] has well pointed ut certain limitations to our prospects not generally recognized by the

---

[30] Foreign Commerce and Navigation of the United States for the Year Ending June 30, 1917, U. S. Dept. f Commerce, Washington, 1918.

[31] Problems in the Development of United States-South American Trade, *Univ. of Pennsylvania Public ectures, 1916-17*, pp. 407-426; noted with comment in the *Geogr. Rev.*, Vol. 5, 1918, p. 338.

Pan-American trade enthusiast. Amongst these is feebleness of the reciprocity that is the basis of trade.

In all South America, Buenos Aires, great modern city, great modern port, is unique: so is the railroad net over the Argentine *pampa*. The population of Argentina and Uruguay is unique both as regards density and composition—lack of the Indian element. These conditions are not typical of the rest of the continent. We have remarked the lack of modern means of communication in Bolivia. Half the population of that country is Indian, over one-quarter *mestizo*. Only nine towns in the total area of 563,000 square miles have over 5,000 people and only one over 25,000. Here is a population with simple wants and small purchasing power. Their commercial needs can still be satisfied in great measure by a form of trade that characterized Europe in the Middle Ages.

THE SOUTHERN LONG-LEAF PINE BELT

By F. V. EMERSON
Louisiana State University

A generation ago the geographic student read that, for the most part, the Southern yellow pine belt was a dense forest with a relatively small lumber production. The student of today learns that this belt is the main lumber-producing region east of the Rocky Mountains. Twenty years hence, when most of the timber shall have been cut, what will the future student read? This is a geographic question, for geography is concerned with the relations between man on the one hand and soils, climate, and other earth factors on the other; an economic question, for here will be an area greater than that of Texas which must somehow find its place in our economic development; a social question, for its solution will determine whether man in this belt shall live well or poorly, on large plantations or small farms, in towns or in the country. Furthermore, it is quite possible that the future population of the cut-over pine lands will be a more or less distinct political unit, for politics is often markedly affected by earth factors.

A consideration of the problem falls into two main divisions: one concerned with the soils and climate which condition the belt, and the other with the two economic-geographic results, namely (1) the present lumber industry and (2) the future development of the cut-over pine lands.

This belt is often called the yellow pine belt, since most of the Southern pines are comprised in this lumberman's trade term. The long-leaf pine belt, however, as shown on the map (Fig. 1), is remarkably distinct, its margins where it shades off into the short-leaf pine and other trees often being less than a mile in width. The long-leaf pine is so called from its clusters of long needle-like leaves in contrast to the short-leaf pine, which has short needles. A drive through the virgin long-leaf pine forest will long be remembered. The stately trunks rise forty to sixty feet and then spread out their dense foliage, which joins above like the arches of a cathedral. There is little or no undergrowth, and the view fades into a maze of the column-like tree trunks. This variety of pine is a native of the South, with its warm, moist climate. It grows on sandy soils which are relatively infertile, a characteristic shown by the term "pine barrens," which is often applied to these lands. The long-leaf pine belt stretches from southeastern Virginia in a long sweep to Texas and includes an estimated area of 250,000,000 acres, an area considerably greater than that of Texas and nearly five times as large as that of New York. At present from 5,000,000 to 10,000,000 acres are being cut over each year, an area about the size of Massachusetts.

The Lumbering Industry

There has been for many decades a considerable lumbering industry in this belt along railroads and rivers, and the timber is pretty well stripped back from the main lines of transportation. Formerly the mills were small, and cutting was limited to distances which could be covered by ox-team and mule-team transportation. Back of these cuttings was an almost unbroken pine forest. Twenty to thirty years ago, when the Northern forests were approaching exhaustion, professional lumbermen bought these virgin pine forests at nominal prices. We have seen that the transportation problem of getting the logs to mills and then getting the lumber to market had limited local development, for local companies possessed small capital. To locate large mills on a railroad and then haul the logs ten or fifteen miles or more required well-built tram roads, which are expensive. The large-scale exploitation of the pine timber, therefore, passed to companies possessed of ample capital, and the lumbering industry in this belt, like so many other industries, is largely in the hands of capitalists and strong companies, many holdings including tens of thousands of acres. Fortunately the level and rolling surface offers few obstacles, and thousands of miles of well-built railroads now traverse these forests. Most of these railroads are of standard gage. After the timber has been cut, the owners

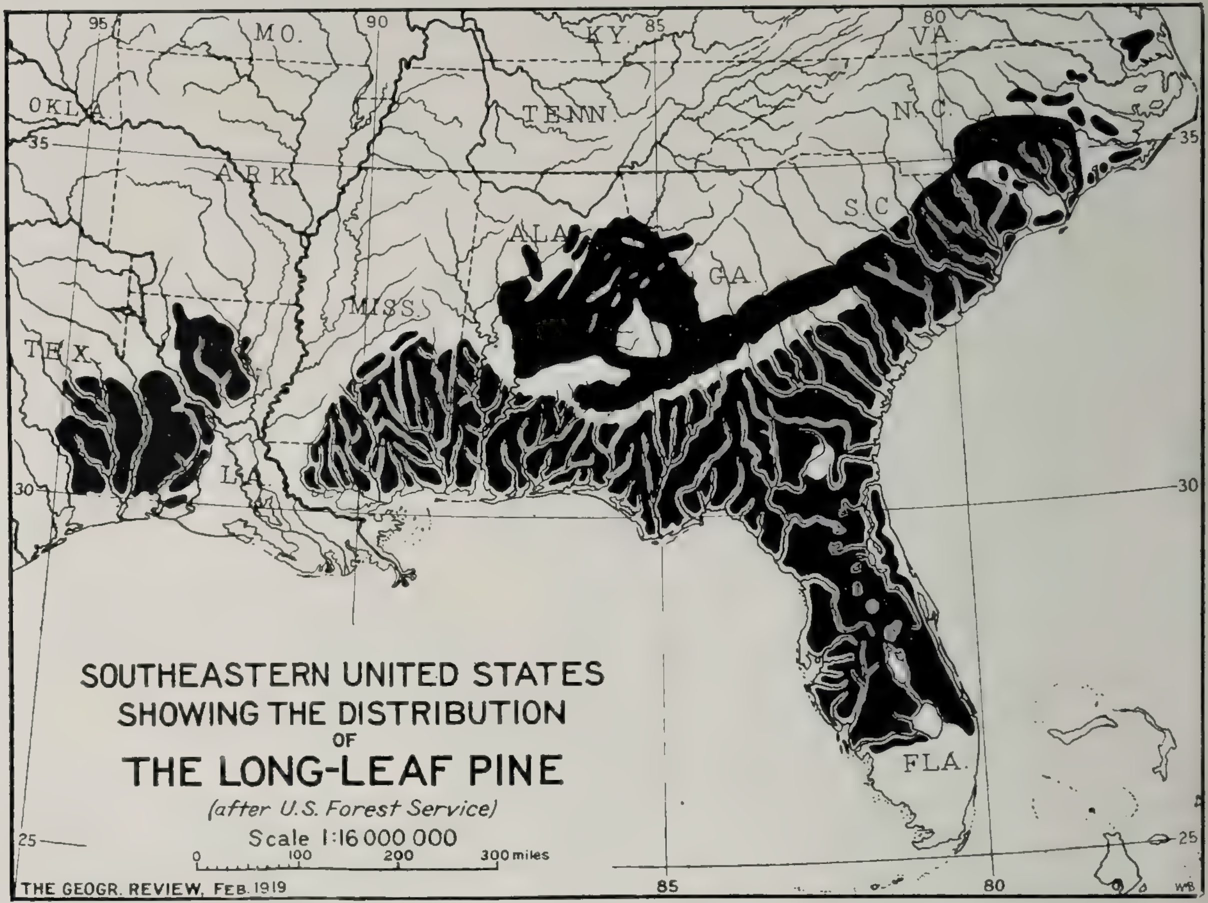


FIG. 1—Map of the southeastern United States showing the distribution of the long-leaf pine. Scale 1:16,000,000. (Based on the "Atlas of North American Forests," Part I: Pines, Pl. 35, U. S. Forest Service, Washington, D. C., 1913.)

are reluctant to abandon the expensive railroads and so maintain some train service, with the hope that the country will develop and make the roads profitable or that some trunk line will buy them as feeders. Many of the abandoned tram roads are now used as public highways, and they will be an important factor in the development of cut-over lands.

A large lumber mill is interesting. After the logs reach the tram road, they are loaded by cranes and carried to a pond, from which they are drawn to the saw. The logs, large and small, are placed and handled by ingenious machinery, and but a few minutes are needed to transform the largest log into lumber. It is indeed fortunate that, when the urgent call for wooden ships came in the war emergency, these well-equipped mills with abundant timber were ready and not far from the Gulf shipyards. While lumber is the principal product, it must not be forgotten that millions of dollars' worth of pitch is gathered from these trees for some years before they are cut. At most mills the slabs and sawdust are carried to a pile which burns night and day —a most regrettable waste. Yet a beginning has been made in utilizing both the slabs and the sawdust for charcoal, alcohol, and paper.

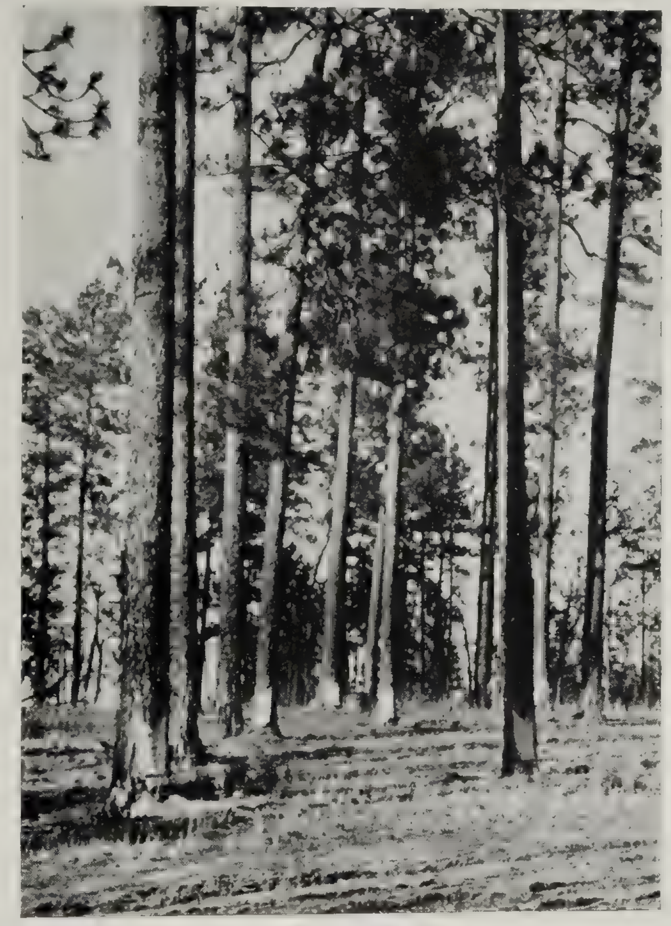


FIG. 2—Long-leaf pines cupped for gathering pitch.

Lumbering in this belt employs about a quarter of a million men, and nearly a million people are dependent on the industry. The lumber towns are, as a rule, up to date, with electric lights, city water, often gas, and sometimes paved streets. The schools are always good. These towns are necessarily more or less temporary, yet the modern method of extending tram roads for considerable distances insures the town's existence for ten to twenty years until the timber of the tributary territory is cut. They are far from resembling the "shack" towns which grow up around small mills. These mill towns are serving and will serve as nuclei for the rural population which occupies the cut-over lands as the timber is removed.

THE CUT-OVER LANDS

The common practice is to remove not only the timber but also the smaller trees which can be used for poles and paper pulp, for, while the expensive tram road is in operation, it is to the lumberman's advantage to get out all the timber he can, even if the profit on some of it is low. Almost invariably forest fires sweep through the timber wreckage of cut-over lands, and much of the cut-over country is dismal indeed. The pine almost everywhere implies relatively infertile sandy soils—relatively, let it be said, for some sandy soils have been made very productive. While the pioneer on the Western prairies could at once break his sod and raise wheat and corn, while the farmer in arid regions quickly gets a crop from his irrigated soil, and the farmer in drained wet lands is usually fairly sure of his first crop, the farmer on cut-over lands must first build up his soil, which is usually deficient in nitrogen and humus and often phosphorus. These large areas of cut-over lands are thrown onto the market faster than they can be absorbed. The states are vitally interested, for, with the cutting of the timber, land values slump and taxes are decreased; it is therefore very important for the state that these lands be put to use. The railroads are apprehensive that freight traffic will all but disappear when the lumber is gone; the owners are obviously interested in disposing of these lands; the nation is interested in them as a possible substitute for the public lands of the West. The question of utilizing the cut-over pine lands is one of the most important faced by the South today. The three most feasible projects of utilization are reforestation, agriculture, and live-stock raising.

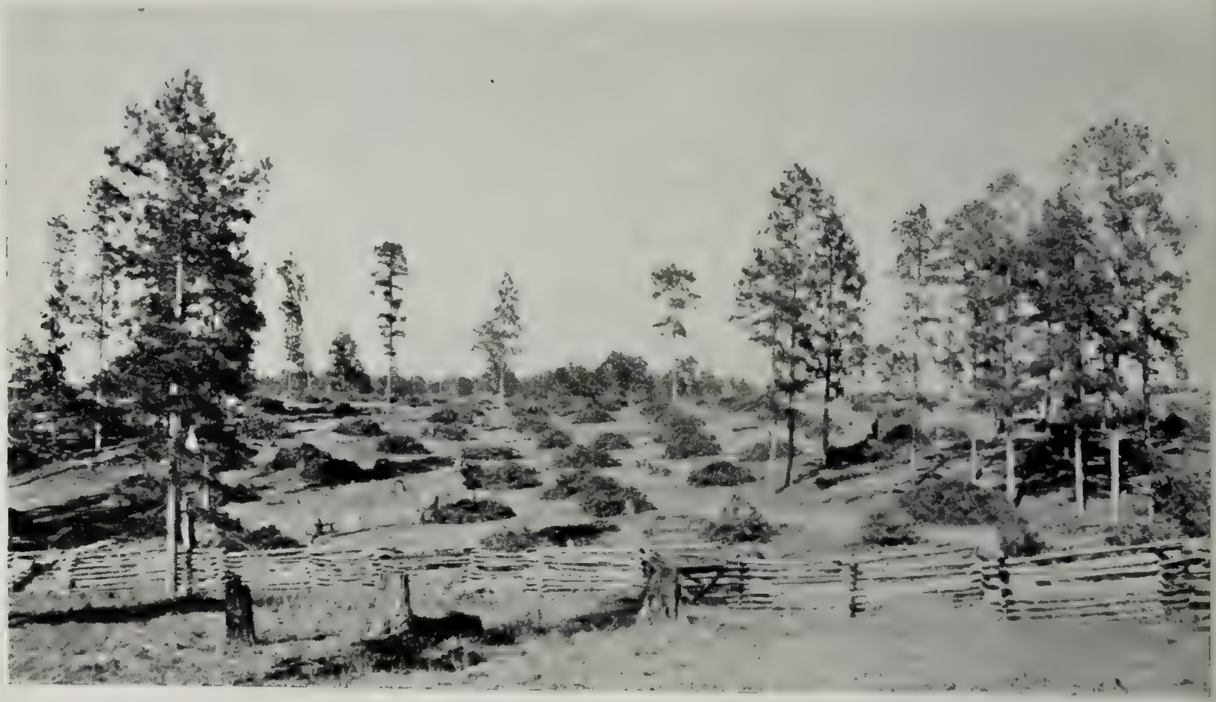


FIG. 3—Clearing the cut-over lands of brush. (Photo by W. E. Tharp.)

REFORESTATION

It is estimated that not far from twenty per cent of the cut-over pine lands should not be cultivated until our population density reaches that of western Europe, and perhaps not then. Some lands are so hilly that active erosion sets in when they are cleared. Other lands are flat, so that drainage is necessary, an expense which the land values will not justify for many years. Still other areas have deep sandy soils of such low natural productivity that most of plant foods must be furnished them. With the present rate of absorption large areas will remain untilled for one, two, or more generations, and in that time reforestation would be profitable. In this connection, two questions must be considered: Is reforestation possible? and Is it commercially feasible? For many years lumbermen have believed that reforestation on a commercial scale is not possible because the usual second growth is not pine saplings, as one might expect it to be, but ''scrub oak,'' a name which fails to indicate the average poor opinion of this shrub which refuses to grow into a tree, which has a trunk so crooked as to be useless even for fence posts, but which quickly occupies the soil in dense thickets. The Hardtner family of Urania, La., who are extensive lumbermen, have proved the possibility of natural reforestation and have made that town classic in forestry. Through their experiments we now know positively that the long-leaf pine seedlings have two enemies, both of which can be abated. Running fires will kill the young seedlings, and these fires are almost annual occurrences during the dry spells. Again, the razor-back hog, which roams far and wide, is very fond of long-leaf pine seedlings and roots, and he will root up an almost incredibly large area in getting his day's food. It has been shown that, by keeping down fires and fencing out the hogs, a pine forest can soon be started and that after a few years' growth it will withstand both hogs and ordinary fires.

The average lumberman, however, is after his ''clean-up'' and, like the rest of us, is not much interested in a crop that will not mature for twenty years or more, so that reforestation will probably be carried on mainly by well-organized corporations which have an eye to future dividends. As an instance of this, the Great Southern Lumber Company of Bogalusa, La., is operating pulp mills to utilize the smaller logs. Within twenty years their present stand of virgin timber will have been cut, and they are starting reforestation with a view of providing timber against that time.

AGRICULTURE

Conditioning factors of agriculture are soil, climate, transportation, and markets—the latter two factors being fairly favorable to the cut-over pine lands. The soils are not productive, else the westward-moving emigrants would not for the most part have passed around this belt. They yield somewhat scant crops of cotton, corn, and wheat unless they are quickened with commercial fertilizers. But, as if nature wished to compensate for a shortage of nitrogen and humus, these soils produce heavy growths of cowpeas, velvet beans, and peanuts—all legumes which capture nitrogen from the air and leave it in the soil, besides furnishing the best of feed. The pine

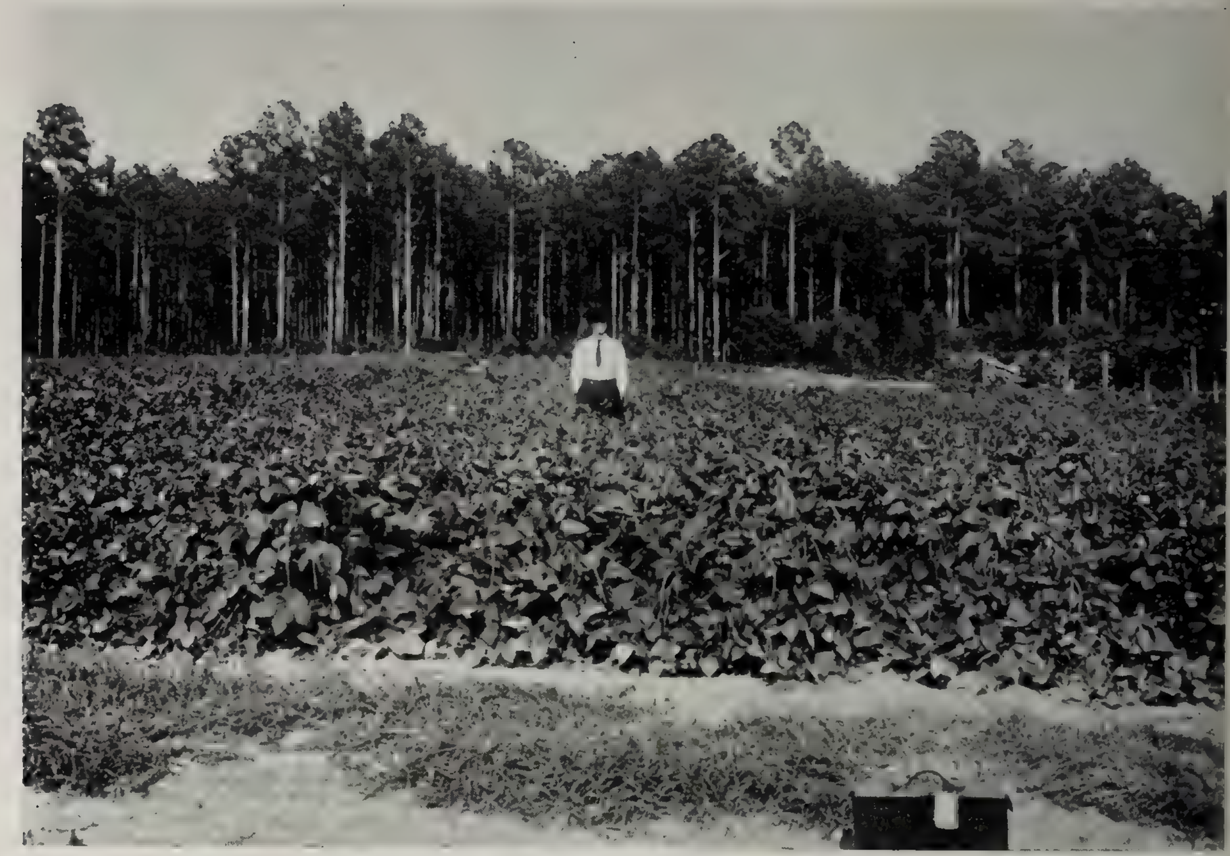


FIG. 4.

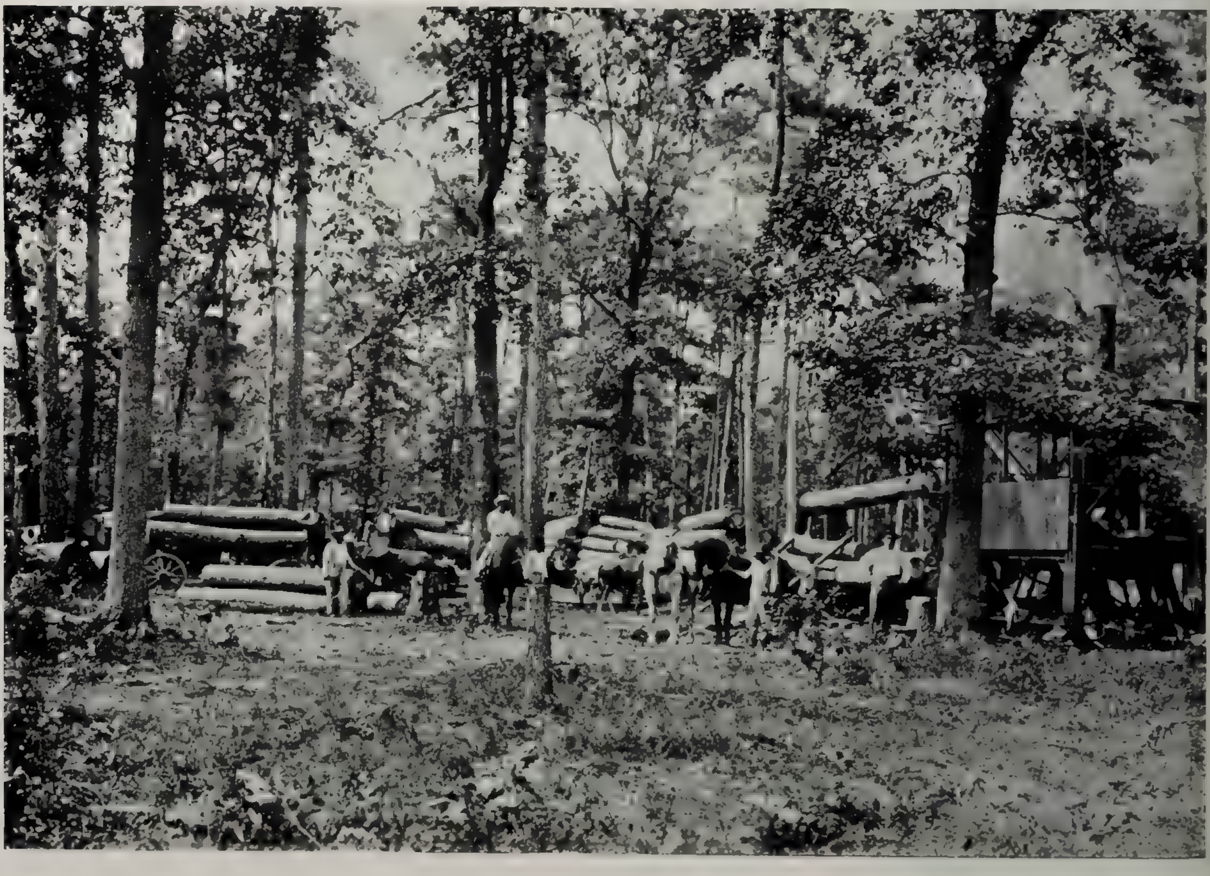


FIG. 5.

FIG. 4—A field of legumes on cut-over pine land (Louisiana Agricultural Experiment Station).
FIG. 5—Logging scene. The logs are loaded on cars by the steam derrick on the right.

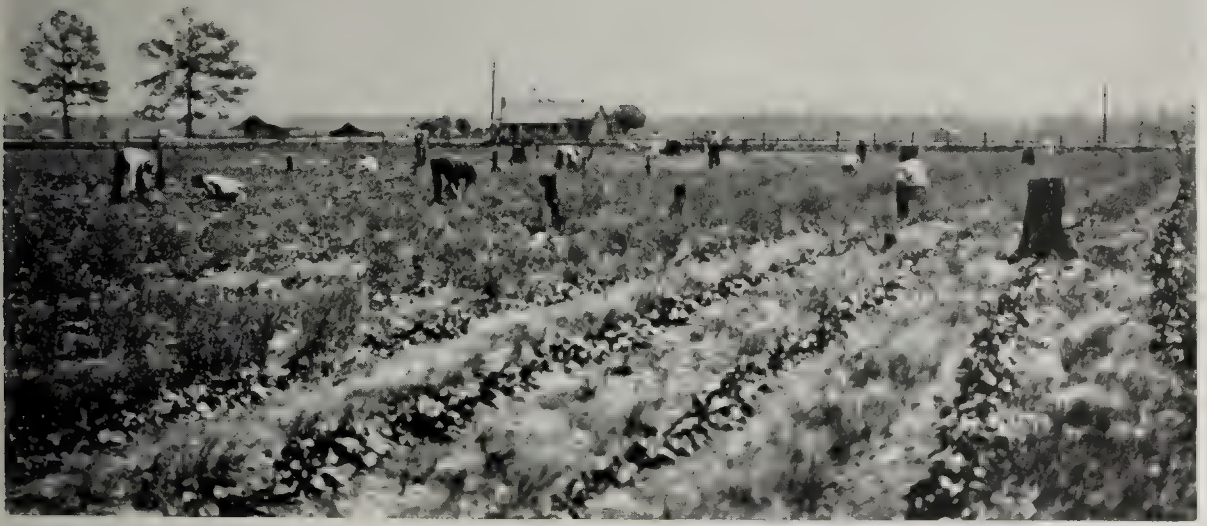


FIG. 6.

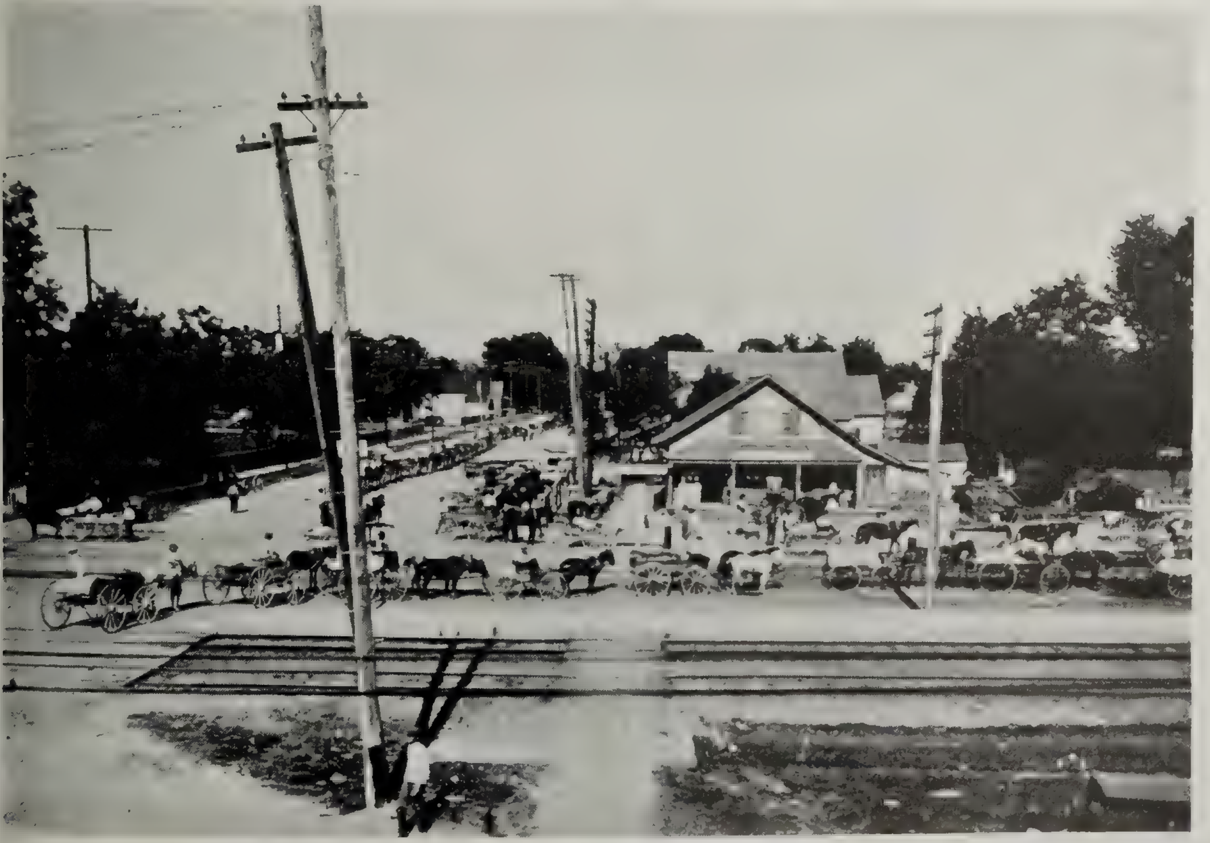


FIG. 7.

FIG. 6—A strawberry field on cut-over pine land. (Photo by G. L. Tiebout.)

FIG. 7—Loading strawberries. (Photo by G. L. Tiebout.)

soils are "warm," they drain readily, and are therefore excellent truck soils. The strawberry growers of Tangipahoa Parish in eastern Louisiana ship about $3,000,000 worth of berries annually. Their lands are rolling to level, with typical sandy soils underlain by impervious clay. Many of the growers are Italians, who, with characteristic thrift and industry, have drained and built up the soils, until they have acre values of $100 or more, while similar lands outside the berry district may be bought for $10 an acre. But trucking has at best a limited market; the crops are intensive, and at most only a small portion of the long-leaf pine soils can be used for truck. Some of these lands have yielded two bales of cotton to the acre and sell for more than $100 an acre, but only after long and skillful building up.

Cut-over lands must, of course, first be cleared of brush. This is easy if the lands have recently been cut over, for there is little undergrowth in the virgin forest; but upon lands long cut over this clearing is expensive. For the first crops it is not necessary to remove the stumps, since the plow can be run around them. Furthermore, it is now possible to extract the resin from the stumps. Thus not only can the removal of stumps be paid for but in some instances profits of $15 an acre or more have been realized in addition. As the grain farmer of the West has so often "mined" his soil, so the farmer in this belt has in many cases with his cheap lands found it easier to clear new fields than to build up old ones. The old fields are often "turned out" to become covered with brush, and one may often see old cotton rows extending through young forests. Such a wasteful method will probably continue for some time; but the South, like many other sections, is faced with a shortage of labor, which will tend to lessen this practice. In the pine belt the mobile labor tends to drift toward the mills, and fresh land requires extra labor for clearing. Furthermore, the newly cleared land is too rough for the machine cultivation which is to replace hand cultivation. In short, the sandy pine lands in their present state are not adapted to quick, profitable yields of such crops as the corn and wheat of the Middle West. They must be built up; but during the process the fertilizing legumes, which grow so readily, will provide hay and grazing. Then, too, the long seasons permit an almost continuous use of the land.

Live-Stock Raising

Stock-raising on an extensive scale calls for cheap grazing lands available for as large a part of the year as possible. Such conditions were supplied by our Western lands before the ranch was crowded out by the farm. After the summer grazing was over and as winter came on, the grass died down to a nutritious hay; but the day of large tracts of range lands is rapidly passing, and beef cattle are decreasing. Grazing is being pushed to the dry lands, and these are shrinking as water is found to irrigate them. Thus, with the rising cost of meats come new inducements to live-stock raising, and the Southern pine belt offers the most readily available lands for this needed live-stock expansion. The mild climate permits open-air maintenance nearly all the year around. The wild grasses of the cut-over lands grow in the spring and summer and furnish fairly good pasturage, but by autumn they have dried, not to the nutritious hay of the West, but to a woody remnant that will scarcely afford sustenance. Here again, however, nature has provided a substitute in the hardy, nutritious *Lespedeza*, or, as it is often called, Japan clover—a nourishing grass which creeps behind the timber cutter to occupy the cut-over land and which, being a legume, adds nitrogen to the soil. The stockman should provide fall and winter grazing, and for this nothing is better than the cowpeas and velvet beans which grow so luxuriously but which require plowing and sowing each year.

The razor-back hog and ''piney woods'' cattle of this belt do not connote the symmetrical, bulky, heavy swine and steers which are associated with our ideas of luscious hams and tender steaks. These denizens of the pine lands have evolved from generations which were obliged to ''rustle'' far and wide for food, and one must be strong of jaw and vigorous of digestion to relish their meat. This native stock, however, has a most valuable characteristic; they grade well with blooded sires and transmit their own hardiness together with the size and meatiness of blooded stock. Sheep-raising is an industry of cheap new lands. Sheep will graze on rough lands and will consume not only grass but young brush. This industry is no longer an experiment on cut-over lands; flocks up to thousands are flourishing on the well-drained cut-over lands of this belt. Dairying is a form of intensive farming which demands considerable tillage for forage crops as well as close attention to the herd. The high prices for dairy products in recent years have stimulated this industry in the South as well as elsewhere. The dairyman and his herd, however, require years for their upbuilding, and scarcely more than a promising beginning has been made on the cut-over lands. Yet enough has been done to show that dairying is entirely practicable.

Mixed Farming

It appears that, generally speaking, the successful farmer on cut-over lands will combine stock-raising and cropping. Live stock need legumes, which require cultivation, while the corn-and-cotton farmer needs live stock for the upbuilding of his lands. The average farm in the United States comprises about 130 acres, and the cut-over lands ready for settlement each year would provide nearly 60,000 of these farms and support something like 200,000 people. It is not easy to predict the future, but it is probable that a considerable acreage will be retained indefinitely by the holding companies. Large ranches will be given over to the raising of live stock together with some production of legumes for winter feeding. A considerable area will be divided into farms of moderate size, especially near towns and along good roads. Some lands will be reforested. The development of these lands awaits immigrants either from densely settled portion of the United States or from abroad. Possibly with the war's close ther may be a return to the rural regions of the young men who have seen th productive farming of Europe. High prices of farm products will probably check or possibly reverse the present movement of our populatio cityward. Immigration from abroad may be resumed and flow to thes cheap lands and this mild climate. Whatever the final solution of the problem, the development of this Southern empire is important both to the South and to the nation.

THE ETHNOGRAPHY OF THE YUGO-SLAVS*

By MILIVOY S. STANOYEVICH

The homeland occupied by the Slav race before the great migration of nations appears to have been the basins of the Vistula, Pripet, and Dniester. From this seat, in the period of the third to the seventh centuries, the Slavs began to migrate and spread in all directions, towards the Baltic, owards the lower Dnieper, and towards the Danube, i. e. into the Balkan Peninsula. From the tribes moving towards the lower Danube originated the Serbians, Croats, and Slovenes, known today under one name, the Yugo-Slavs, or Southern Slavs.

INVASION OF THE BALKAN PENINSULA

The exact time when the Southern Slavs began to penetrate into the Balkans is not known to a certainty. According to the Russian chronicle of Pseudo-Nestor, there were, at the time of the Trajan conquests, Slavs in Dacia; but the Volkhi or Vlakhi (i. e. Romance speakers) had conquered and driven some of them to the Danube and some to the Vistula. The truth of this may be inferred from the vestiges of bad repute which the name of Trajan has left in Slavonic tradition. In any case we cannot say that the Slavs occupied a large part of the Balkan Peninsula before the beginning of the sixth century, when they appear in Byzantine history as a new terror. By 584 they had overrun almost all of Greece and were the most western neighbors of the Eastern Empire. In a book on military art, "Strategica," ascribed to Emperor Maurice, directions were given for dealing with the Slavs,[1] and Emperor Leo set forth his theory of the military principles to be used against them in his "Tactics."

By the end of the seventh century the Southern Slavs were permanently settled throughout the whole of the Balkan Peninsula. On the extreme west lived the Slovenes (Sloventsi), who occupied the regions now known as Carniola (Krayina, Krain), Carinthia (Khorutania, Korushko), and Styria (Stayersko, Steiermark). On the east of the Slovenes lived the Croats, who came from the northern slopes of the Carpathians (hence the names Carpati, Horvati, Hrvati). They extended their territory far beyond the limits of modern Croatia and included parts of Bosnia and the Adriatic coast, where was nurtured a hardy race of sailors, equally fitted for fishing, commerce, or warfare. The eastern division of the great Slav migratory horde was formed by the Serbs (Serboi or Sirbi, as the Byzanti historians called them). They colonized the land between the Isker Riv and the Adriatic coast, including Serbia, Bosnia, Hertsegovina, Montenegr northern Macedonia, Slavonia, the Bachka, and the Banat.

---

* The author in this paper does not include the Bulgarians among the Yugo-Slavs. While they are generally considered as belonging ethnically to the group (see e. g. Jovan Cvijić [Yovan Tsviyity]: The Geographical Distribution of the Balkan Peoples, *Geogr. Rev.*, Vol. 5, 1918, pp. 345-361; reference on p. 355), the present political antagonism between the Serbs and the Bulgarians and the limitation of the proposed Yugo-Slav state to the Serbo-Croats and Slovenes may foreshadow a gradual restriction in the future of the term "Yugo-Slav" to the western branch of the Southern Slavs.—For names of geographical features consult the ethnographic map of the Balkan Peninsula accompanying the paper by Cvijić cited above.—EDIT. NOTE.

[1] See C. Yirechek: Istoriya Srba (History of the Serbians), Bk. 2, Ch. 1, Belgrade, 1911.

Racial Unity of the Southern Slavs[2]

Writers who describe the Southern Slavs recognize that, although the are divided into three nationalities, they are closely akin and form on compact race. Their dialects shade into one another, and there is no trac of great influence by other Slavonic groups. The Southern Slavs were cu off from the Western and Eastern Slavs by the foundation in the sixt century of the Avar kingdom in Pannonia (now Slavonia) and, after it destruction in the seventh century, by the spread of the Germans south eastwards and finally by the incursion of another Asiatic horde, that o the Magyars, who have maintained themselves in the midst of the Slav for a thousand years. Their conquests were made chiefly at the expens of the Slovenes and the Slovaks, from whom they borrowed many words i forms which have now disappeared. On the border of the large area between the Tyrolese Alps on the west and the Balkans on the east the Yugo-Slavs came into contact with the old Illyrians, Romans, Greeks, and Vlakhs.[3] The mixture with these nations in the course of centuries has somewha modified the real Slavonic type. There are now to be found among th Southern Slavs more of the Roman and Greek dark eyes than of the gra eyes characteristic of the pure Slavs. The handsomest types of all the Southern Slavs are to be found in the region between the Neretva and Timok Rivers.

The Three Types

The latest researches have divided the Southern Slavs into three different groups or characteristic types. These are: the Dinaric, the Macedonian, and the Pannonic types. The Dinaric type is found generally in the region of Istria, Croatia, Dalmatia, Bosnia-Hertsegovina, Montenegro, and northern Serbia. The Macedonian type occupies southern Serbia and northern Macedonia. In the Pannonic type one may count the people of Carniola, Slavonia, the Bachka, and the Banat. Within these three main types should be also included some subvarieties, of which we shall speak later.

The Dinaric Type

Individuality

The Dinarics are easily marked out from the other types. They are the typical western Yugo-Slavs, who have kept their national feelings quite touched by foreign influences. Although the people of this type have en partitioned by neighboring powers, they have maintained their in- viduality in spite of all outside interference. The most prominent marks the mental life of this type are versatile wit, keen intelligence, extreme nsibility, and abundance of intellectual power. These people usually llow their inspirations, caring little for material considerations. An ppeal made to their sense of honor or their ideal of liberty and justice rings a quick response. They manifest a vivid desire to live, to develop, make a success of their careers, and to be worthy representatives of their ace.

---

[2] See also Jovan Cvijić: Unité ethnique et nationale des Yougoslaves, *Scientia*, Vol. 23, 1918, pp. 455-463. —Edit. Note.

[3] See: Jugoslavia, A New European State, *The Century Magazine*, March, 1918, pp. 687-692, New York.

THE "ZADRUGA"

A most typical sign of Southern Slav social life is the custom known as e *zadruga.* This is a community of 20 to 80 members knit together by ties f blood and living adjacent to each other. The *zadruga* dates from a very arly period, perhaps from the time the Yugo-Slavs came to the Balkans. s the primitive Dinaric population settled in an isolated and mountainous egion, this method of life probably owed its origin and maintenance to he simple human necessity for companionship. Under Turkish dominion t grew and expanded because the Turks demanded toll from every house, nd the peasants by living in *zadruga* style could include many homes nder a single roof, and thus pay but one tax for all. Being composed of greater number of members, the *zadruga* also received more respect from ational enemies.[4] Although the *zadruga* is gradually dying out, it is never- heless to be found more often in the Dinaric regions than in any of the ther parts of Yugo-Slavia.

THE "SLAVA"

Attached as are the Yugo-Slavs to their *zadruga,* they are no less rev- rential of their ancestors, especially in Montenegro and Serbia. Here more than anywhere else in Yugo-Slavia ancient family names are passed n from generation to generation. Family genealogies are considered very precious. Also the feast of the patron saint, the *slava,* receives much attention, ranking after Christmas and Easter as the most important day of the year. A family not blessed with a male heir is considered quite humiliated, and when one says: "*Nyegova se kut͡ya ugasila*" (his house is extinguished), it means that the last male has died and the ancestral line is ended. A strong feeling for tradition is also to be noted. From Rieka in Croatia to Kotor in Dalmatia the most important facts of local history are handed down from generation to generation by word of mouth.[5]

---

[4] See: Obichayi Naroda Srpskoga (The Customs of the Serbian People), edited by the Serbian Academy of Science, Vols. 1 and 2, Belgrade, 1907-08.

[5] See: Zbornik za Narodni Zhivot i Obichaye Yuzhnikh Slavena (A Collection of the National Usages and Customs of the Southern Slavs), edit. by the Yugo-Slav Academy of Science, Vol. 8, Zagreb, 1903.

SUBVARIETIES OF THE DINARIC TYPE

The subvarieties of the Dinaric type are those of the Shumadia, Bosnia, and Hertsegovina. The Shumadia variety occupies almost all of Serbia tributary to the Morava River and is composed of old ethnic groups made up of immigrants from the west and south. These strong and virile Shumadian (forest) peasants adapted their mental characteristics to the new geographical and social environment and, when the Turkish Empire in the beginning of the nineteenth century began to decay, were among the first insurgents to throw off its yoke and proclaim an independent state. Democratic sentiment is more developed among the people of this subvariety than among any other Yugo-Slav type. Like the whole type, however, the Shumadians show a remarkable inclination toward science, literature, and art. From this region came the grand figure of Vuk Karadzhity, the founder of modern Serbian literature.

The Bosnian is distinguished by a certain languor of speech and action, and the Hertsegovinian (Era) by his trickery. Their physical constitution is massive and their stature tall. With these physical traits there goes the mental accompaniment of tranquility and taciturnity. They are overprolific, and, because of the working out of the Malthusian law, many of them are forced, like their neighbors the Dalmatians, to emigrate to foreign parts, especially the United States.[6]

The Macedonian Type

DOMINANT TRAIT

The Macedonian type has had less of an evolution than the Dinaric, and it lacks individuality. There are archaic customs to be found in the region of the Macedonian type, something of Old Slavic, ancient Balkan, and Turco-Byzantine. The tendency towards realism is the dominant trait of this type.

The original tribes of this region were at the beginning of the Middle Ages subjected to a Byzantine influence which considerably modified them. After the dissolution of the Byzantine Empire the *zadruga* persisted among the Macedonians, and today one sees these family groupings in the region of Kossovo and the Metohiya, as well as in the belt of land occupied by the Shops on the border of Bulgaria. Though both the *zadruga* and the *slava* are to be found among the Shops, these institutions soon disappear as one approaches the Isker River. The *zadruga* in all these regions is not so marked in type as it is in the Dinaric confines; less warmth and intimacy are felt among its members.

ARCHAIC CHARACTER

The Macedonian type has not mixed with the Pannonic or Dinaric, and it lacks the deep national consciousness of the latter. History is crystallized n traditions, sentiments, and national tendencies. It is as if the generations had only transmitted a physical inheritance. The soul has ever remained the soul of the ancient Slav. Even the language has been practically stationary. While the Dinaric type has abandoned many old forms for new ones, the Macedonian has kept its archaic mold. Yet, although it has retained most of its old words and linguistic forms, it has not become entirely petrified, for some foreign elements have crept in. The people preserve their old ways. Women are extremely backward, keeping to their old-fashioned costumes, remarkable for rich ornamentation. If one were to stand in the midst of a crowd of Yugo-Slavs, he would have no difficulty in detecting the man of Macedonian type by his exterior as well as by the archaic traits of his language and mentality. He is a vigorous example of basic Slavic character, less contaminated by recent foreign influences and ethnic assimilation than the Dinaric or Pannonic types. Remnants of ancient Byzantine civilization emerge now and then, sometimes mixed with Turco-Oriental peculiarities.

---

[6] See: Naselya Srpskikh Zemalya (Population of Serbian Lands), edit. by Serbian Academy of Science. Bk. 6, Belgrade, 1909.

The region occupied by the Macedonian type is the basin of the Southern Morava and the Vardar Rivers, which was the portion of the peninsula most completely submerged by Byzantine domination. Longer than any other section this region remained during the Middle Ages under the direct sway of Constantinople. The principal longitudinal routes traversed this province, and contiguity to Saloniki and Constantinople made itself felt. Many cities of Macedonia, for instance Seres, Voden, Bitolia, and Okhrida, were strongly Islamized. Finally, these regions were longest cut off from contact with Western civilization and culture, owing to the strictness of Turkish surveillance.[7]

SUBVARIETIES OF THE MACEDONIAN TYPE

The subvarieties of the Macedonian type are the Shops and Torlaks. The domicile of these varieties is found in the basins of the Timok, Nishava, and Isker Rivers. ''Torlak'' means a man who speaks neither good Bulgarian nor good Serbian, and the name ''Shop'' signifies a rustic. Both these ethnic groups were influenced to a lesser degree by Byzantine civilization than were the southern Macedonians. They preserved their patriarchal institutions longer than did the Dinarics and still celebrate the *slava* like the rest of the Serbians. Being very industrious, they know how to utilize their savings. When they can find no employment in their sterile and mountainous country they emigrate to Rumania or to North or South America. Sofia, the capital of Bulgaria, happens to be situated in the heart of the region occupied by these subvarieties. Consequently many Shops and Torlaks were Bulgarized, especially those who did not move over to Serbian lands. Those who emigrated to Serbia lost their Bulgarian character and are regarded as pure Serbians.[8]

---

[7] See: Etnoloshka Gradya i Rasprave (Ethnological Materials and Researches), edit. by Serbian Academy of Science, Belgrade, 1910.

[8] Same work as cited in footnote 6, Bk. 11, Belgrade, 1912.

The Pannonic Type

TERRITORY OCCUPIED

According to the researches of the Serbian geographer, Jovan Cvijić,[9] the area inhabited by the Pannonic type is situated north of the Save and Danube Rivers, in the old province of Pannonia. Roughly speaking it includes the Pannonic plain to the east and a part of the Dinaric Alps to the west. From an economic standpoint there are three different regions occupied by the Pannonic Slavs. On the east are Syrmia, the Bachka, and the Banat, territory completely agricultural. Slavonia and a part of Croatia are given over to agriculture and forestry, especially the district of Croatian Zagorye.[10] The lands of the Slovenes belong to the third economic division, where industry, particularly the mining of coal and mercury, is more developed than in either of the former regions.

ORIGIN AND CHARACTER

The story of how the Slavs came to the Pannonic regions is told in the pilgrimage of the Serbian patriarch Arsen III, who, escaping before the on-coming Turks, left southern Serbia accompanied by 30,000 retreating Serb families and fled along the valley of the Morava, over the Save and Danube, to the fertile plains of southern Hungary. There they settled, having been promised land and other privileges in return for their pledge of protection to the Austrian Empire in case of further attacks by the Turks.[11]

The population of the Pannonic region as a whole has been influenced by various tides of immigration. Syrmia, the Bachka, and the Banat in their patriarchal life resemble the Macedonian type. Traces of ancient Balkan civilization may be found there; while the people of Slavonia, Syrmia, and Carniola, in their mentality reflect their contact with the Dinaric type. It has been proved that people living on plains have a spirit less alert than mountaineers. Such is the case with the Pannonics, who as a rule are a farming class and in disposition are even-tempered and emotionally static.

THE CROATS AND SLOVENES

The Croats and Slovenes are the representatives of Central European civilization among the Yugo-Slavs. The Slovenes are known as great organizers of industry and business enterprises in general. This quality was strengthened in the economic struggle against their northern and western neighbors.[12] The Croats are enthusiasts, poets, and idealists. The founders of Yugo-Slavism were the Croatian patriots, Lyudevit Gay and ishop Strosmayer. Their educational institutions in Zagreb attract the outh from all Yugo-Slav lands, as does the Paris Sorbonne the youth of he world.

---

[9] Jovan Cvijić: La Péninsule Balkanique: Géographie Humaine, Part V, Chs. 16-18, Paris, 1918.

[10] Transmontana, "beyond the woods," i. e. from Slavonia.

[11] See H. W. V. Temperley: History of Serbia, London, 1917.

[12] See Bogumil Voshnyak: A Bulwark Against Germany, New York, 1919.

Conclusion

Among the three Yugo-Slav types, Dinaric, Macedonian, and Pannonic. here are some linguistic and ethnographic differences. But aside from hese insignificant variations in speech and manners, their mental qualities re practically the same, whether found in Macedonia, Istria, or Slavonia. n all these three Yugo-Slav groups there prevails a common character of ubtleness of thought which causes them to perceive the most delicate uances of feeling and to express them in an artistic manner. Furthernore there is a deep tenderness lying at the bottom of the composite Yugo-lav soul. These sentiments are so vivid that very often in moments of assion they break out into intolerance and result in political or partisan ombats. The Yugo-Slavs are characterized in general by their rich imgination, their capacity for enthusiasm, and their national idealism. In pite of innumerable battles with the Turks in former times, and with ermans and Hungarians more recently, they have been neither destroyed or denationalized. On the contrary, their common sufferings and their ofty idealism have brought them together and made of them not only one ace, but one state and one nation.

THE ISLAND OF THE SEVEN CITIES

By WILLIAM H. BABCOCK

The mythical islands of the Atlantic (*les îles fantastiques*) on the old maps have had divers origins, instructive to study. Perhaps only one o them derives its name and being directly from a real human episode of twilight period in history.

When the Moors descended on Spain in 711, routed King Roderick' army beside the Guadalete, and rapidly overran the Iberian peninsula, i was most natural, indeed nearly inevitable, that some Christian fugitives should continue their flight from the seaboard to accessible islands already known or rumored, or even desperately commit themselves in blindness to the remoter mysteries of the ocean. Such an event would afford a fabric for the embroidery of later fancy. A part of this has been preserved by record; and it is curious to watch the development of the story, which takes several forms not differing widely, however, one from another.

The Island of Brazil

When Pedro de Ayala, Spanish Ambassador to Great Britain, found occasion in 1498 to report English exploring activities to Ferdinand and Isabella, he wrote:

> The people of Bristol have, for the last seven years, sent out every year two, three, or four light ships (caravels) in search of the island of Brasil and the seven cities.[1]

There is indeed one well-attested voyage of 1480 conducted by well-known navigators, seeking this insular Brazil, and it was not the earliest.

The first appearance of that island thus far reported is on the map of Dalorto[2] (dated 1325) as a disc of land well at sea, westward from Hibernian Munster; but the Catalan map[3] of 1375 and at least one other turn the disc into a ring surrounding a body of water which is studded with small islands—apparently eight in the Catalan map photographically reproduced by Nordenskiöld, though Dr. Kretschmer draws seven on the other. These miniature islands have sometimes been thought[4] to represent the seven cities of the old legend; but islets are not cities, and there seems no reason why each city should require an islet. However, the coincidence of number, exact or approximate, is suggestive.

---

[1] G. E. Weare: Cabot's Discovery of North America, London, 1897; reference on p. 59.

[2] A. Magnaghi: Il mappamondo del genovese Angellinus de Dalorto (1325): Contributo alla storia della cartografia mediovale. *Atti del terzo Congr. Geogr. Italiano, tenuto in Firenzi dal 12 al 17 Aprile, 1898,* Florence, 1899, Vol. 2, pp. 506-543.

[3] A. E. Nordenskiöld: Periplus: An Essay on the Early History of Charts and Sailing-Directions, trans. by F. A. Bather, Stockholm, 1897, Pl. II.

[4] E. g. by Nordenskiöld, *op. cit.*, p. 164.

ANTILLIA

Antillia (variously spelled) was a home for the elusive cities more favored than Brazil by cartography and tradition. In 1474, Toscanelli, a cosmographer of Florence, being consulted by Christopher Columbus as to the prospects of a westward voyage, sent him a copy of a letter which he had written to a friend in the service of the King of Portugal. In it occurs this passage:

> From the island of Antillia, which you call the Seven Cities and of which you have knowledge, there are ten spaces [2,500 miles] on the map to the most noble island of Cipango [Japan].[5]

The name Antillia had appeared on the maps much earlier. As Atilae, or Atulae, it is doubtfully found in an inscription on that of Pizigano (1367),[6] identifying a "shore," not drawn, on which a colossal statue of warning had been erected. The location seems to be somewhere in the region where Corvo of the Azores should appear.

We meet the island name, for the first time unmistakably, on the map of Beccario (Becharius) of 1435.[7] It is applied to the chief of a group of four large islands, comparable to nothing actually in the western Atlantic except the Greater Antilles, or three of them with Florida (Bimini). They are collectively designated "Insulle a Novo Repte"—the "Newly Reported Islands." Antillia itself is shown as an elongated quadrilateral having its sides indented by seven two-lobed bays of identical form, beside another and larger bay in the southern end. Several subsequent maps repeat the delineation with little change, and the map of Benincasa (1482)[8] supplies local names for the bays or the regions adjoining excepting only the lowest but one on the eastern side, which bay is opposite the middle of the island name Antillia. The other names as read by Dr. Kretschmer are Aira, Ansodi, Con, Anhuit, Ansessali, and Ansolli. It will be observed that four of them borrow the first syllable of Antillia. Nobody has explained these names, and they seem mere products of linguistic fancy. But again the coincidence in number is impressive, although somewhat offset by the fact that the next largest island in the group, Saluaga, has a similar arrangement of five bays of like form and carries the names, similarly applied, of Arahof, Duchal, Imada, Nom, and Consilla. They can hardly be extra bishops' towns. At least we are in the dark about them. The anonymous map sometimes attributed to 1424 and preserved at

---

[5] Fernando Colón: The Discovery of America by Christopher Columbus, Edinburgh, 1811, Vol. 3, Part II, Bk. 2, Ch. 1, Sec. 2, p. 26.

[6] [E. F.] Jomard: Les monuments de la géographie, ou recueil d'anciennes cartes européennes et orientales . . . Paris, [1842-62], Pl. X, 1.

[7] Gustavo Uzielli: Mappamondi, carte nautiche e portolani del medioevo e dei secoli delle grandi scoperte marritime construiti da italiani o trovati nelle biblioteche d'Italia, Part II (pp. 280-390) of "Studi Bibliografici e Biografici sulla Storia della Geografia in Italia," published on the occasion of the Second International Geographical Congress, Paris, 1875, by the Società Geografica Italiana, Rome, 1875; reference on Pl. 8 (the second edition, Rome, 1882, does not contain the plates).

[8] K. Kretschmer: Die Entdeckung Amerikas in ihrer Bedeutung für die Geschichte des Weltbildes, 2 vols. (text and atlas), Berlin, 1892, Pl. 4.

Weimar[9] shows in photographic copy traces of names, or at least letters, on the part of Antillia which it represents. Its true date is believed to be about that of Benincasa's map above cited. But the markings do not seem to be identical and are very meager.

The Legendary Home of Portuguese Refugees

However, there can be no doubt of Toscanelli's meaning at an earlier date in the passage quoted. The same is true of Behaim's globe (1492), though he discards the accepted form of Antillia. He appends a long inscription, translated by Ravenstein as follows:

> In the year 734 of Christ, when the whole of Spain had been won by the heathen (Moors) of Africa, the above island Antilia, called Septe citade (Seven cities), was inhabited by an archbishop from the Porto in Portugal, with six other bishops, and other Christians, men and women, who had fled thither from Spain, by ship, together with their cattle, belongings, and goods. 1414 a ship from Spain got nighest it without being endangered.[10]

Again, in Ruysch's map of 1508 there is "a large island in the middle of the Atlantic Ocean between Lat. N. 37° and 40°. It is called *Antilia Insula*, and a long legend asserts that it had been discovered long ago by the Spaniards, whose last Gothic king, Roderik, had taken refuge there from the invasion of the Barbarians."[11]

Fernando Colón, living between 1488 and 1539, says that some Portuguese cartographers had located

> Antillia * * * not more than two hundred leagues due west from the Canaries and the Azores. This they assert to be certainly the island of the Seven Cities, which is said to have been peopled by the Portuguese in the year 714 at the time when Spain was conquered by the Moors. According to this legend seven bishops with their people sailed to this island, where each of them built a city; and, that none of them might think of returning to Spain, they burnt their ships with all their tackling and destroyed everything that was necessary to navigation. There are those who affirm that several Portuguese mariners have been to that island but could never find their way back to it again.[12]

He relates particularly how "in the time of Prince Henry (perhaps about 1430) a Portuguese ship was driven by stress of weather on the island of Antillia." The crew went to church with the islanders but were afraid of being detained and hurried back to Portugal. The Prince heard their story and ordered them to return to the island, but they escaped from him and were not found again. It is said that of the sand gathered on Antillia for the cook room a third part was gold.

---

[9] W. H. Babcock: Indications of Visits of White Men to America before Columbus, *Proc. 19th Internatl. Congr. of Americanists, Held at Washington, Dec. 27-31, 1915*, [Smithsonian Institution,] Washington, D. C., 1917, pp. 469-478; map on p. 476.

[10] E. G. Ravenstein: Martin Behaim: His Life and His Globe, London, 1908; reference on p. 77.

[11] A. E. Nordenskiöld: Facsimile-Atlas to the Early History of Cartography, transl. by J. A. Ekelöf and C. R. Markham, Stockholm, 1889, p. 65 and Pl. 32.

[12] Fernando Colón, *op. cit.*, pp. 29 and 30.

Galvano tells of a still later visit; or possibly it is only another version of the same:

> In this yeere also, 1447, it happened that there came a Portugall ship through the treight of Gibraltar; and being taken with a great tempest, was forced to runne westwards more then willingly the men would, and at last they fell upon an Island which had seven cities, and the people spake the Portugall toong, and they demanded f the Moores did yet trouble Spaine, whence they had fled for the losse which they eceived by the death of the king of Spaine, Don Roderigo.
>
> The boatsswaine of the ship brought home a little of the sand, and sold it unto a goldsmith of Lisbon, out of the which he had a good quantitie of gold.
>
> Don Pedro understanding this, being then governour of the realme, caused all the things thus brought home, and made knowne, to be recorded in the house of justice.
>
> There be some that thinke, that those Islands whereunto the Portugals were thus driven, were the Antiles, or Newe Spaine.[13]

Another Account

The Portuguese historian Faria y Sousa has yet another version. According to Stevens's translation:

> After Roderick's defeat the Moors spread themselves over all the province, committing inhuman barbarities. * * * The chief resistance was at Merida. The defendants, many of whom were Portuguese, that being the Supreme Tribunal of Lusitania, were commanded by Sacaru, a noble Goth. Many brave actions passed at the siege, but at length there being no hopes of relief and provisions failing, the town was surrendered upon articles. The commander of the Lusitanians, traversing Portugal, came to a seaport town, where collecting a good number of ships, he put to sea, but to which part of the world they were carried does not appear. There is an ancient fable of an island called Antilla in the western ocean, inhabited by Portuguese, but it could never yet be found, and therefore we will leave it until such time as it is discovered, but to this place our author supposes these Portugals to have been driven.[14]

It is plain that Captain Stevens paraphrases with comments rather than translates. The original[15] avers that the fugitives made sail for the Fortunate Islands (the Canaries), in order that they might preserve some remnants of the Spanish race, but were carried elsewhere. It also specifies that the legendary island which they are supposed to have reached is inhabited by Portuguese and contains seven cities—*tiene siete cividades.*

This last account lacks positive mention of the emigrating bishops and for the first time names a definite though rather remote goal as aimed at by their effort. But the movement from Merida is well accounted for, and a trusted military commander would seem a natural leader for such an enterprise of wholesale escape. The bishops, implied by the seven cities, might well gather to him at Oporto or be picked up on the way. On the whole it seems the most easily believable version of the story; though of course it does not necessarily follow that they really chose any land so remote as Teneriffe and its neighbors—if they knew of them—for a new abiding place. Of course the continuance of Portuguese language and civilization and the persistence of seven isolated towns through so many centuries must be ranked with the auriferous sands of Antillia as late products of the dreaming Iberian brain.

---

[13] Antonio Galvano: The Discoveries of the World from Their First Original unto the Year of Our Lord 1555. Published in England by Hakluyt (1601). Reprinted for the Hakluyt Society, London, 1862; reference on p. 72.

[14] Manuel de Faria y Sousa: The History of Portugal, transl. by Capt. John Stevens, London, 1698; reference in Bk. 2, Ch. 6, p. 112.

[15] Manuel de Faria y Sousa: Epitome de las Historias Portuguesas, 2 vols., Madrid, 1628; reference in Part II, Ch. 7, p. 257.

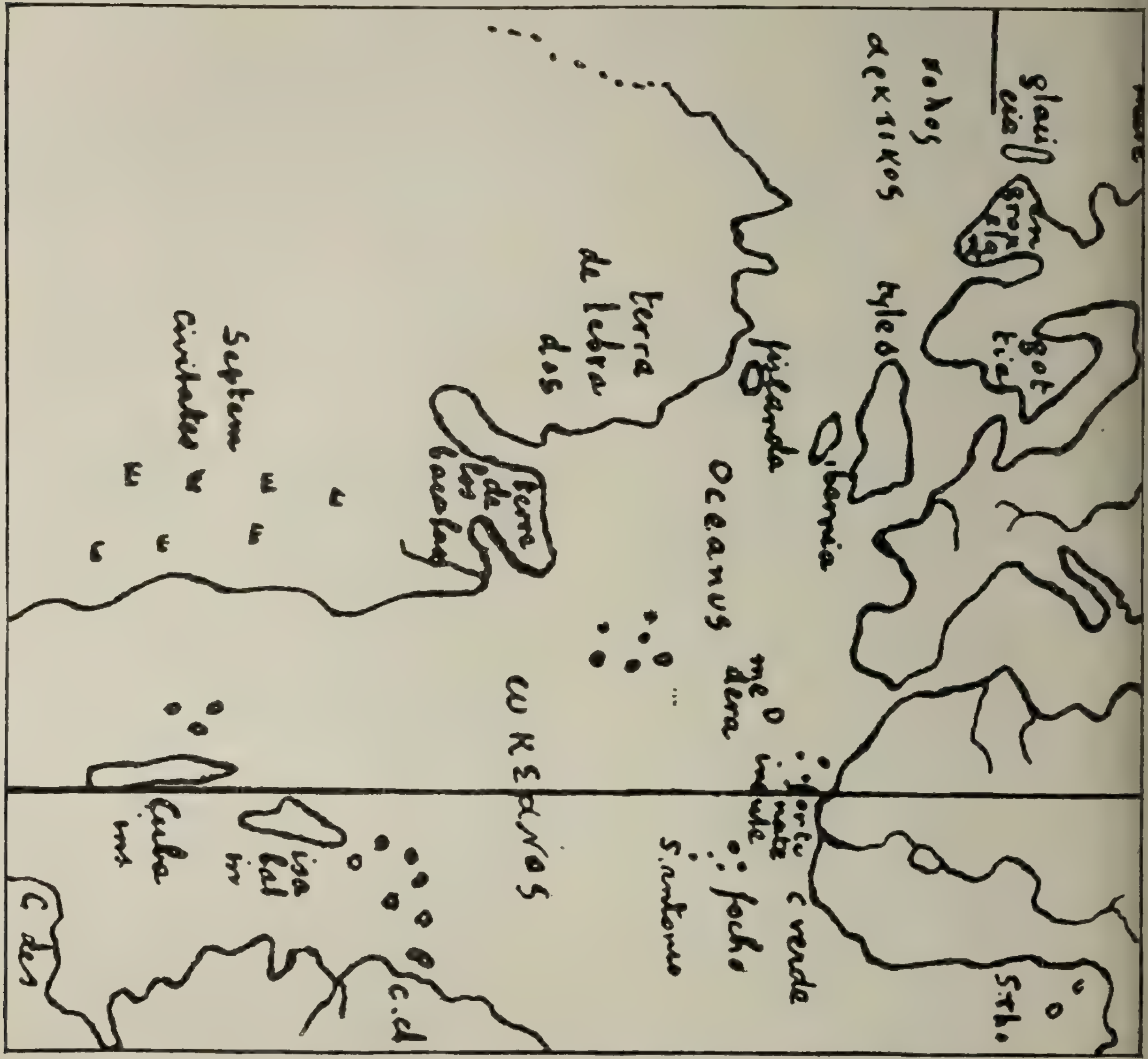


Fig. 1—Section of an anonymous world map of about 1520 (Egerton MS. 2803, British Museum) showing the Seven Cities, represented as miters, scattered along the Atlantic seaboard of North America. (From copy in Schuller manuscripts, Manuscript Division, Library of Congress, Washington, D. C.)

Mythical Location of the Seven Cities on the Mainland

The citations thus far given identify the Island of the Seven Cities with some legendary, but generally believed-in patch of land afar out in the ocean—sometimes with the Island of Brazil, more often with Antillia. But the earliest of them dates six or seven centuries after the supposed fact, and it may well be that a distinction was made at first, which became lost afterward by blending. In a still later stage of development the name of the Seven Cities becomes separate and strangely migratory, not avoiding even the mainland. We know, for instance, what power the Seven Cities of Cibola had to draw Coronado and his followers northward through the mountains and deserts of our still arid Southwest until all that was real of them stood revealed as the even then antiquated and rather uncleanly terraced villages of sun-dried brick which are picturesquely familiar on railway folders and in the pages of illustrated magazines.

But this was not the only part of North America on which the romantic myth alighted. The British Museum contains in MS. 2803 of the Egerton collection an anonymous world map,[16] attributed by conjecture to 1520, showing, somewhat as in La Cosa's map of 1500, the Atlantic coast distorted to a nearly westward trend, with the Seven Cities (Septem Civitates), represented by conventional indications of miters, scattered along a seaboard tract from a point considerably west of "terra de los bacalos" and the Bay of Fundy to a point nearly opposite the western end of Cuba (Fig. 1). The cartographer's ideas of geography were exceedingly vague, but apparently he conceived of Portuguese episcopal domination for the coastal country between lower New England and Florida as we know them now. Perhaps, however, he merely meant to set down his cities somewhere on the eastern shore of temperate North America and has strewn them along at convenience.

Incidentally, this map is also interesting as one of a few which inscribe Antillia, with slight changes of orthography, on some part of the mainland of South America. In this instance "Antiglia" occupies a tract of the northwestern coastal country apparently corresponding to contiguous portions of Colombia, Ecuador, and Peru.

Later Reappearance as an Island

But the Island of the Seven Cities appeared as such on other maps and by this name only. Perhaps its most salient showing is on Desceliers' fine map[17] of 1546, that entertaining repository of isles which are more than dubious and names which are fantastic (Fig. 2). He presents it off the American coast about a third as far as the Bermudas and midway from Cape Breton to the Bay of Fundy. The size is considerable, the outline being deeply embayed on several sides and hence very irregular, almost as much so as Celebes. Two islets lie near two of its projecting peninsulas. It bears a brief inscription giving the name Sete Cidades and indicating that it belongs to Portugal.

This choice of location would have been more venturesome a century later. In 1546 there had been some exploring and much fishing in these waters but no determined settlement near them, and they were hardly yet familiar. However, the Ortelius map[18] of 1570 (Fig. 3), and the Mercator map[19] of 1587 find it more prudent to move this island farther south and farther out to sea, reducing its area but retaining its traditional name. Not long after this, except for a local name on St. Michaels of the Azores, th Seven Cities disappear from geography.

---

[16] Copy in Schuller manuscripts, Manuscript Division, Library of Congress. Reproduced with this article (Fig. 1).

[17] K. Kretschmer, *op. cit.*, Pl. 17.

[18] Nordenskiöld: Facsimile-Atlas, Pl. 46.

[19] *Ibid.*, Pl. 47.

Occurrence of the Name in the Azores

The exception noted is well worth considering. Just as Terceira retains her medieval name of Brazil to designate one headland, St. Michaels has

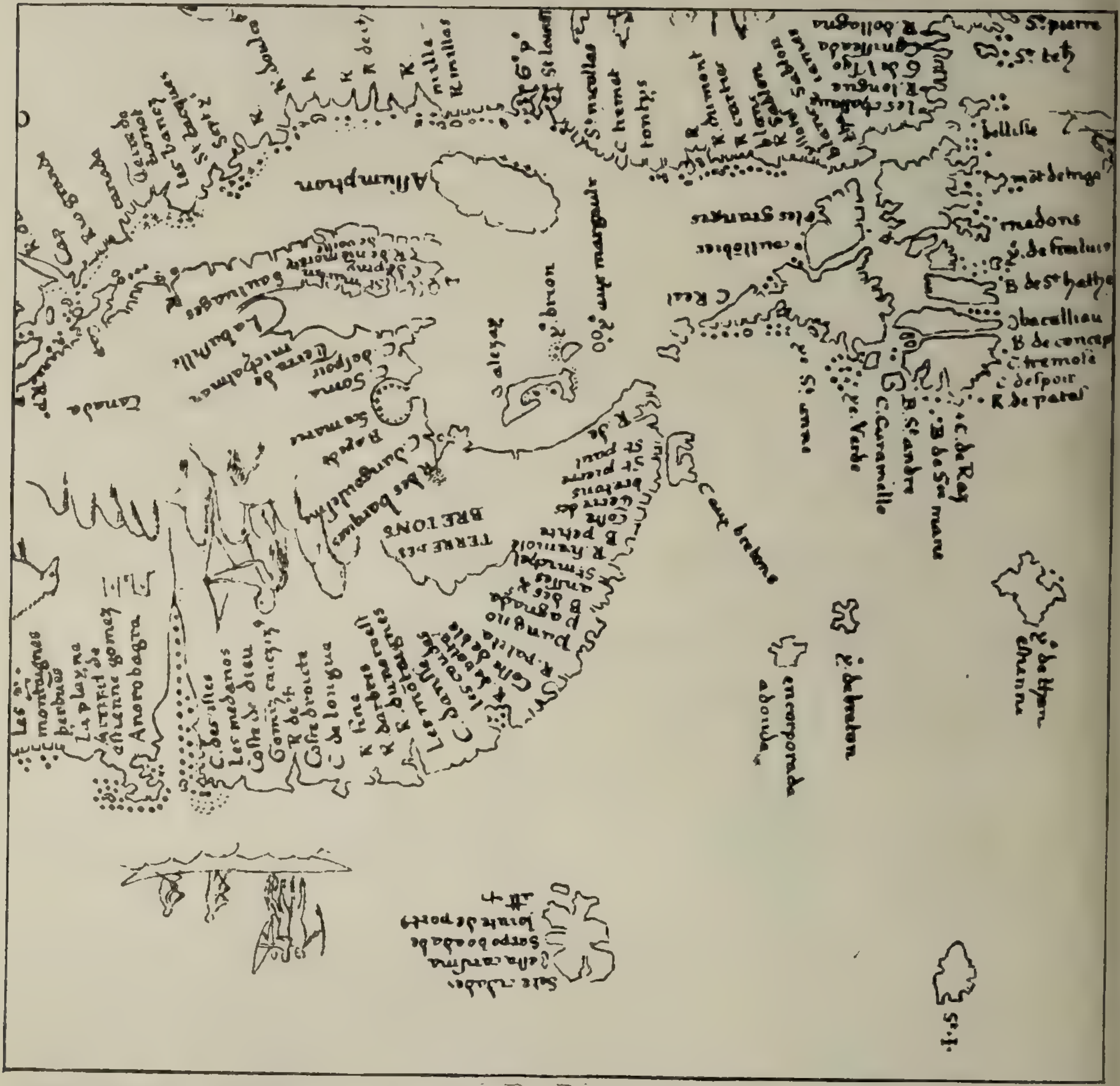


FIG. 2—Section of the Desceliers map of 1546 showing the Island of the Seven Cities (off the Nova Scotian coast; the inscription is upside down, because the original map is oriented with the south at the top). (From K. Kretschmer: Die Entdeckung Amerikas in ihrer Bedeutung für die Geschichte des Weltbildes, Berlin, 1892, atlas, Pl. 17.)

still its valley of the Seven Cities. Brown's guidebook presents the fact very casually: "St. Michaels. Ponta Delgada. Brown's Hotel. About ten people. Among the chief sights are the lava beds coming from Sete Cidades. * * * At Sete Cidades, which is worth a visit, there is a great crater with two lakes at the bottom, one of which appears to be green, the other blue."[20]

---

[20] A. S. Brown: Guide to Madeira and the Canary Islands (with notes on the Azores), 5th edit., London, 1898; reference on p. 148.

This naïve incuriousness in the presence of something so significant of course has not been shared by a different order of observers. Buache[21] found here as he thought the genuine and only Seven Cities of the legend. Humboldt[22] opposed this view with a reminder of the Seven Cities of Cibola. But it is fair to remember that New Mexico was quite impossible for the Portuguese of 711 or thereabout, whereas St. Michaels Island offered an accessible and tempting place of refuge. The name could not have been derived from settlement in the former; but it might really be derived from settlement in the latter. Granting that the fugitives might not be able to maintain themselves there in safety for many years after the Arabs had begun their tentative and always uneasy incursions into the western Sea of Darkness, it still may be that the town or towns of this hidden island valley might endure long enough and seem imposing enough and be visited often enough by Christians from the mainland to supply

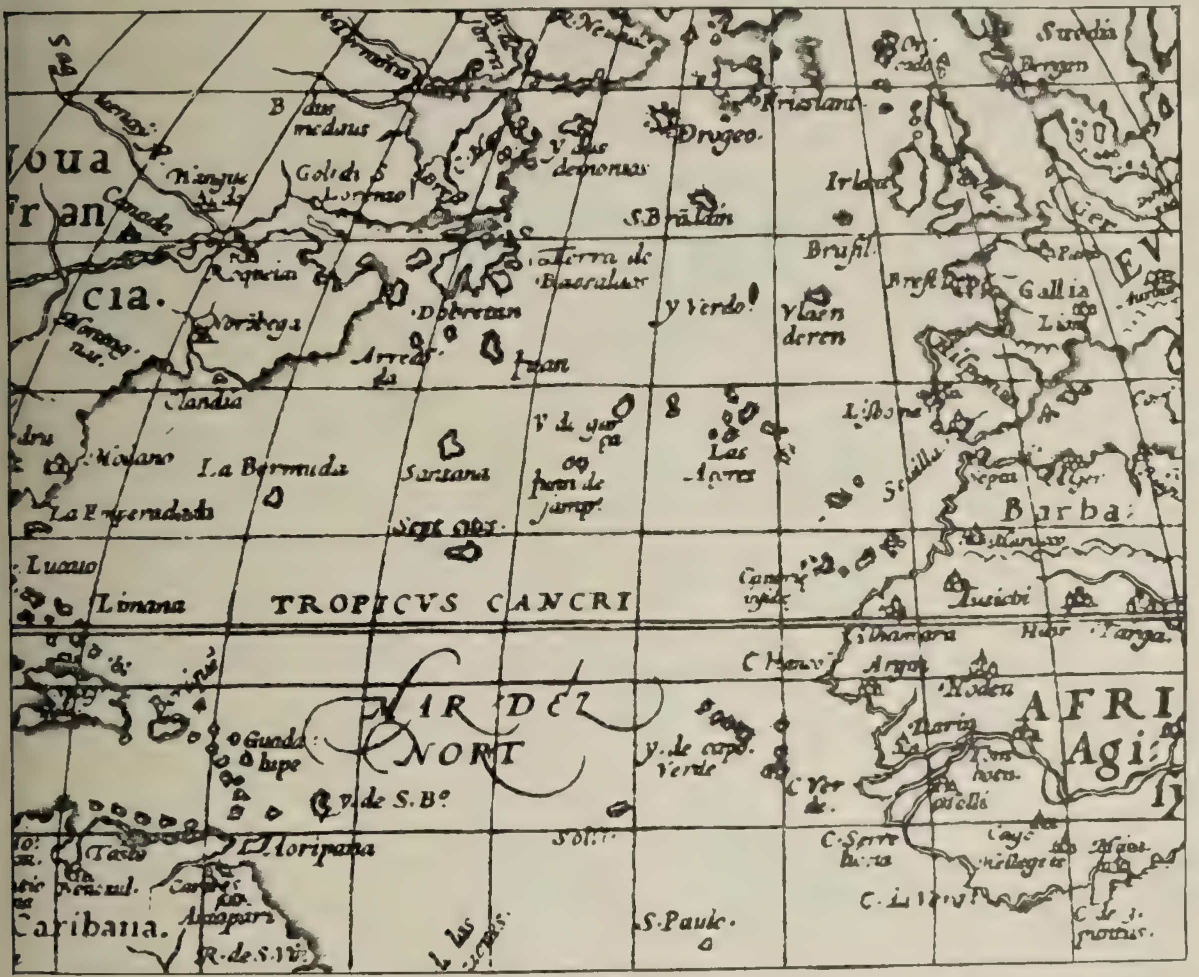


FIG. 3—Section of the Ortelius map of 1570 showing the Island of the Seven Cities (in the longitude of Newfoundland and the latitude of Florida). (From A. E. Nordenskiöld: Facsimile-Atlas to the Early History of Cartography, Stockholm, 1889, Pl. 46.)

---

[21] N. Buache: Recherches sur l'île Antillia et sur l'époque de découverte d'Amérique, *Mémoires de l'Institut des Sciences, Lettres, et Arts*, Vol. 6, 1806, pp. 1-29, following p. 84 of Section entitled "Histoire" and appended list. See p. 13.

[22] A. von Humboldt: Examen critique de l'histoire de la géographie du Nouveau Continent, 5 vols., Paris, 1836-37; reference in Vol. 2, p. 281.

the nucleus of the most picturesque and adventurous of legends; and this tale might follow any later migration into the unknown, or survive and find new abiding places for the name and fancy long after the original colony—archbishop and bishops and congregations, military commanders, and mailed soldiery—had all been somehow destroyed or had melted apart and drifted away. All that remains certain is the continued presence of the name of the Seven Cities on that spot.

Some ruins are said to have marked it formerly, but very little is visible now, if we may trust the following description by an intelligent visitor in the middle of the last century:

> Emerging from these sunken lanes, so peculiar to the island of St. Michael's, we come to the green hills which border the village and the valley of the Seven Cities. * * * From these dull evergreen mountains, stretching before us without apparent end, we speedily had an unexpected change. Suddenly the mountain track up which we were climbing ended on the edge of a vast precipice, hitherto entirely concealed, and at a moment's transition disclosed a wide and deeply sunk valley with a scattered village and a blue lake. The hills which hemmed them in were bold and precipitous, tent-shaped, rounded and serrated. Others swept in soft and gentle lines into a little plain where the small village was nestled by the water side. The lake was of the deepest blue and so calm that a sea bird skimming over its surface seemed two, so perfect was its image in the water. The clouds above were floating in this very deep lake, and the inverted tops of the hills on every side were perfectly reflected in its bosom. A few women on the shore seemed rooted there, so steady were their reflections in the water, and the cattle standing in the shallows stood like cattle in a picture. * * * The sides slope gradually from this part of the valley into the level ground where the village stands. It is a small collection of cottages, without a church or a wineshop or a store of any kind, and at the time I entered it was enveloped in clouds of wood smoke which rose from the fires used in the process of bleaching cloth. This and clothes washing are the chief occupations of the villagers. * * *
>
> A portion of the lake is separated from the larger one by a narrow causeway. It is singular to notice the difference made in the two pieces of water by this small embankment; for, while the large lake is clear and crystalline, this is thick, green, and muddy, and as gloomy as the Dead Sea, with no clouds or birds or bright sky reflected in it.[23]

Perhaps a little excavating archeology might not be amiss in the neighborhood of the causeway and the green dead lakelet. But at least it is satisfactory to have a good external account of the only site in the world, so far as I know, which still bears the legendary name. As elsewhere used, this name has certainly wandered widely and been affixed to many places. Whether any of these represent real refuges of the original emigrants or their descendants or others like them no one can quite certainly say; but there is no evidence for it, and the probabilities are against it. Certainly no Spanish nor Portuguese community, of Moorish or of any pre-Columbian times, established itself in western lands for any great period to make good the aspiration of the fugitives of Merida.

---

[23] Joseph Bullar and Henry Bullar: A Winter in the Azores and a Summer in the Baths of the Furnas, 2 vols., London, 1841; reference in Vol. 2, pp. 242-247.

THE BALTIMORE MEETING OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS

The fourteenth annual meeting of the Association of American Geographers, held at Baltimore on December 27 and 28, 1918, marked the resumption of the Association's regular meetings after an interval of two years. The 1917 meeting had been omitted because of the absorption of its members in war activities. The last meeting had been held in New York at the end of 1916 (*Geogr. Rev.*, Vol. 3, 1917, pp. 140-143) and the last joint meeting with the American Geographical Society on April 14 and 15, 1916 (*Geogr. Rev.*, Vol. 1, 1916, pp. 366-367).

The sessions were held at Johns Hopkins University in connection with the seventy-first meeting of the American Association for the Advancement of Science. In spite of the comprehensive program of the larger body the geographical papers held the interest of the members throughout the sessions and attracted a goodly number of visitors besides. Of the forty-one papers announced some thirty were read.

Papers on Surveying and Mapping

There were several papers on surveying and mapping, most of them, as many of the papers on the program in general, related to the war. A paper by Colonel Glenn S. Smith on "American Mapping in France" discussed the methods used at the front. Mr. F. E. Matthes of the U. S. Geological Survey spoke on "The American Topographer in the Rôle of Artillery Orientation Officer." Mr. F. H. Moffit, likewise of the Survey, in a paper entitled "A Method of Aërial Topographic Mapping" discussed the camera for the making of photographic surveys from airplanes in the perfection of which he has been associated with Major J. W. Bagley of the Survey. A preliminary description (The Use of the Panoramic Camera in Topographic Surveying, *U. S. Geol. Survey Bull. 657*, 1918) has been noticed in the *Review* (Vol. 6, 1918, p. 71). A member of the staff of the U. S. Coast and Geodetic Survey read a paper on the wire-drag work of the Survey which has been so successful in the detection of minor obstructions to navigation, such as ledges, pinnacles, etc., which escape the usual methods of marine surveying. Mr. Matthes also described an attempt to standardize instruction in map making in the Boy Scout movement.

Physiography

General physiography was represented by a paper on "Physiographic Evidence for Subsidence of Reef-Encircled Islands" by Professor W. M. Davis of Harvard University, a continuation of his studies on the coral islands of the Pacific. Mr. C. F. Marbut of the Bureau of Soils of the U. S. Department of Agriculture spoke on "The Relation of Soil to Topography."

Meteorology and Climatology

There were five papers dealing with some phase of meteorology or climatology, Professor A. J. Henry of the U. S. Weather Bureau spoke on "Increase of Precipitation with Altitude," referring especially to the rainfall atlas of Java which was discussed in the June, 1918, *Review* (pp. 492-495); Dr. C. F. Brooks of the same bureau on "Atlantic Ocean Temperatures and Long-Range Forecasting"; Professor R. DeC. Ward of Harvard University on "Rainy Days and Rainfall Probability in the United States" (printed in the January, 1919, *Review*, pp. 44-48); Colonel R. A. Millikan on "Mapping Upper Air Currents for the Aviator"; and Dr. O. L. Fassig of the Maryland Weather Service on "The Signal Corps School of Meteorology."

PHYTOGEOGRAPHY: POLITICAL GEOGRAPHY

A suggestive paper in the field of phytogeography was that by Professor Henry C. Cowles of the University of Chicago on "The Present and Past Climates of Our Leading Crop Plants." Political geography was represented by an address by Professor A. P. Brigham of Colgate University on "The Philosophy of National Boundaries."

ECONOMIC RESOURCES

A conspectus of the mineral resources of the world was given by Mr. J. B. Umpleby of the U. S. Geological Survey under the title of "World View of Mineral Wealth." A paper by Professor N. A. Bengtson of the University of Nebraska under the title "Potash, A Factor in Winning the War" related the story of the exploitation of the alkaline lakes in the sand hills region of western Nebraska, reference to which was made in the *Review* at the time (Vol. 3, 1917, pp. 67-68).

EDUCATIONAL

Several papers dealt with the effect on geography of the educational reorganization brought about by the war. Professor H. E. Gregory spoke on "Geography in the Work of the Students Army Training Corps" and on "Organization of Geographic Instruction in the Universities." Professor W. M. Davis spoke on "The Work of the Geography Committee of the National Research Council." Professor Davis also read a memorial of the late Grove Karl Gilbert, drawing on an appreciation he had published in a recent number of the *American Journal of Science.*

REGIONAL PAPERS ON NORTH AMERICA

Five papers dealt with some aspect of the regional geography of North America. Dr. E. O. Hovey of the American Museum of Natural History described some of the features of the Greenland coast from Melville Bay to Etah, based on his observations during the MacMillan expedition. An excellent paper, read by an assistant of Dr. O. E. Baker, of the U. S. Department of Agriculture, dealt with "The Agricultural Lands of the United States, Present and Potential." The paper, which was illustrated by numerous maps, was based on the great amount of material that has become available in the preparation of the "Atlas of American Agriculture," in course of publication by the Department. Dr. Roland M. Harper in a paper entitled "A Statistical Study of New England Geography" presented on a map a subdivision of New England into natural regions that is of special interest in view of the fact that this area has been omitted in the various schemes of classification, recent and earlier. A paper by Professor C. R. Dryer dealt with the Maumee-Wabash waterway, and one by Dr. T. Wayland Vaughan of the U. S. Geological Survey with the Virgin Islands.

WAR AREAS

Several papers dealt with areas affected by the war. One, entitled "The Terrain and the War in Italy," by Mr. Frederick Morris of Columbia University, discussed the influence of topography on the military campaigns in northern Italy. A paper by Mr. William Churchill on "The Colonies, Late German, in the Pacific" analyzed the strategic elements in the Pacific as conditioned by the new situation brought about by the conquest of the German colonies there. A paper by Miss Ellen C. Semple on "The Ancient Piedmont Route of Northern Mesopotamia" dealt, to use the speaker's own characterization, with the "pedigree" of the Bagdad Railway.

ATTENDANCE

The extensive program left the members little time for other activities. However, on Friday evening, December 27, a joint smoker with the Geological Society of America ook place at the Southern Hotel which afforded opportunity for more extended social ntercourse. On Saturday afternoon the session was held jointly with the Geological Society of America. Some thirty members of the Association attended the meeting, including the following: N. A. Bengtson, William Bowie, A. P. Brigham, C. F. Brooks, William Churchill, H. C. Cowles, S. W. Cushing, W. M. Davis, C. R. Dryer, O. L. Fassig, N. M. Fenneman, H. E. Gregory, R. M. Harper, A. J. Henry, E. O. Hovey, Ellsworth Huntington, W. L. G. Joerg, C. F. Marbut, R. B. Marshall, F. E. Matthes, H. F. Reid, Ellen C. Semple, J. Russell Smith, T. W. Vaughan, O. D. von Engeln, R. DeC. Ward, Bailey Willis. The meeting closed with the reading and adoption by unanimous vote of a resolution of thanks for the hospitality extended to the Association by Johns Hopkins University.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Annual Reports of the Society; Meetings of January. The annual meeting of the American Geographical Society was held on Tuesday evening, January 21, 1919, at the Engineering Societies' Building, 29 West Thirty-ninth Street. The annual reports of the Council, of the Treasurer, and of the Special Committee were read, as follows:

Report of the Council

January 21, 1919

To the Fellows of the American Geographical Society:

The past year has been one of unprecedented activity for the Society. Its most notable occupation was in connection with the so-called 'Inquiry,' organized by the United States Government to prepare information for use by the European Peace Commission. The building and working force, as well as the library and maps of the Society, were used by the Inquiry during the year as the central point from which its operations were directed. A summary of its labors has been widely published and needs only the briefest recapitulation here. Arranged under suitable headings the work comprised: (1) political history, (2) diplomatic history, (3) international law, (4) economics, (5) geography, (6) education. All these materials for reference were assembled at Paris, accompanied by the distinguished compilers, including our Director, Dr. Bowman, who is in attendance on the Peace Commission under the title of Chief Territorial Specialist. The Society has received from the State Department and from the President of the United States official acknowledgment of the patriotic and efficient service rendered.

From amongst the objects of the Society, as defined in its constitution, the management has been disposed to emphasize the dissemination of geographical information. With this educational aspect in view, the character of the *Geographical Review* has been maintained as a scientific publication although not indifferent to the popular side of the subject to which it is devoted. During the past year opportunity was presented to take over the *Journal of Geography*, a monthly magazine for teachers. This periodical has been conducted for many years under Professor Whitbeck of the University of Wisconsin and, being distributed to teachers at a very modest price, has attained substantial influence and circulation. The parties controlling it, however, were of the opinion that its usefulness would be extended if the publication could be brought under the auspices of the American Geographical Society and directed from New York. In this spirit arrangements were perfected for the transfer, and the January number appears in accordance. Our Society will hope to reach, in course of time, a large proportion of the ten thousand teachers of geography in the schools of the United States by presenting a real instrument of advantage in their vocation and one conducted exclusively for them and by them.

The issue of the annual monograph, which it was designed to distribute to our Fellows, as mentioned in our last report, was interrupted by the disorders of the time, but it is expected that it will be forthcoming in the current year. It will be by Professor and Major Douglas W. Johnson and relate to the battle fronts of Europe, to which he made a prolonged visit at the instance of our Society. Another monograph may be expected as the result of an expedition by Professor Mark Jefferson, of the Michigan State Normal College, during the year to South America under the auspices of the Society for the study of the colonies of European settlers in southern Brazil and Argentina. Both of the writers alluded to are now in attendance at the Peace Conference.

The *Annals of the Association of American Geographers*, published through our Society, finds appreciation as heretofore in the higher circles of geographical research.

In connection with the Inquiry a series of forty-one base maps of large size, comprising about sixty sheets were prepared by the Society covering all the principal problem areas of the world. These have proved of great value for study and instruction, and the Society has been encouraged by the War Department to render these available to institutions of learning by using the plates to reproduce the maps at nominal cost. It is believed that they will prove a permanent contribution to education.

It will be seen that our plans for publication are not inconsiderable, but we have reason to think that they are valuable and that they are appreciated by the body of our Fellows. The increased cost of printing and material has been met by the revenue accruing from our marked accession in membership, testifying to the augmented interest of the public.

An exploration by Mr. Theodoor de Booy to Venezuela was supported by the Society to investigate the geography and ethnology of the mountains forming the western boundary of that country, whose interior had never been visited by white men. Interesting observations were obtained which have been detailed in the *Geographical Review*.

Our connection with foreign Societies has been diminished by the cessation of relations with organizations in those countries with which the United States is at war.

The lectures of the Society have been more largely attended than in any past season, evincing anew the aroused interest in our science. Addresses were delivered by the following lecturers: Henry Charles Woods, Hamilton Rice, Charles Upson Clark, Henry Goddard Leach, Roy C. Andrews, Edmund Heller, Toyokichi Iyenaga, Frederick Haynes Newell, Theodore Roosevelt, Bailey Willis, Douglas W. Johnson, and Vilhjálmur Stefánsson.

Additions to the Library comprise 1,000 books, 711 pamphlets, 814 periodicals, 3,027 maps, and 862 atlases. The Library now comprises 53,995 books and pamphlets and 41,653 maps.

The number of Fellows at the close of the year was 3,958, of whom 381 are Life Fellows. The increase during the year was 372 in number.

Three gold medals of the Society were awarded, as follows:

The Cullum Geographical Medal to Frederick Haynes Newell for his important services as organizer and director of the United States Reclamation Service, 1907-1914.

The David Livingstone Centenary Medal to Colonel Candido Mariano da Silva Rondon for his explorations as Chief of the Brazilian Telegraphic Commission, whereby he has contributed more than any other investigator to a knowledge of his country's geography and resources.

The Charles P. Daly Medal to Vilhjálmur Stefánsson, who, in a long and hazardous journey, discovered new lands beyond the Arctic fringe of America and adapted to the white race the way of life of the Eskimo.

The exhibition of maps at the Society's building was necessarily suspended during the occupancy by the Inquiry but has now been resumed and continues to attract the public.

The report of the Treasurer, submitted herewith, gives a summary of the general income and expenses of the Society. Various special gifts by friends of the Society have been disbursed for specific purposes under directions from the generous contributors but by their desire are not presented in the general account.

The Society has information that 158 Fellows have engaged in the military service of the country. As nearly all of these have presumably passed the period of youth their patriotic devotion is the more worthy of notice.

The zeal and efficiency of the staff is highly commended. The attraction of higher pay than the Society could afford has been presented to several of them, but they have preferred to continue their present employment through interest in the work.

Respectfully submitted on behalf of the Council.

John Greenough
Chairman

REPORT OF THE TREASURER FOR 1918

The following is a statement of the receipts and expenses and the condensed balance sheet of the Society as shown by the books on December 31, 1918:

Receipts and Expenses

During the year there has been received for annual dues, interest on investments, and sales of publications	$56,565.89
There has been expended for salaries, house expenses, library, meetings, publications, postage, insurance, etc	55,617.83
Balance carried to income account	$948.06

Condensed Balance Sheet

Cash	$27,418.45	Sundry deposits	$35,032.00
Balance of capital accounts	1,381.08	Annual dues paid in advance	2,360.40
Temporary investments	9,915.04	Income account balance	1,322.17
	$38,714.57		$38,714.57

Henry Parish
Treasurer

Report of the Special Committee

January 16, 1919

The Special Committee appointed at the December meeting of the Council to nominate and recommend to the Society suitable persons to be elected in January, 1919, to fill vacancies then existing in its offices report that they recommend the election of the following-named persons to the offices designated:

		TERM TO EXPIRE IN
President	John Greenough	1920
Vice-President	James B. Ford	1922
Recording Secretary	Hamilton Fish Kean	1922
Treasurer	Henry Parish	1920
Councilors	French E. Chadwick	1922
	Archer M. Huntington	1922
	Levi Holbrook	1922
	Charles A. Peabody	1922

Hamilton Fish Kean
James B. Ford
Allison V. Armour
Committee

The reports of the Council and the Treasurer were approved and ordered on file. The persons recommended by the Special Committee for the offices to be filled received the unanimous vote of the Society and were declared duly elected.

President Greenough thereupon submitted for confirmation the names of 30 candidates for Fellowship, each of whom had been approved by the Council, and they were confirmed as Fellows of the Society. The lecture for the evening was entitled "East-Westerly Politics," by Professor Albert Bushnell Hart of Harvard University.

At an extra inter-monthly meeting on January 7 Mr. Theodoor de Booy addressed the Society on "The Sierra de Perijá (Venezuela) and Its Native Tribes." Mr. De Booy's lecture dealt with the expedition undertaken under the auspices of the Society, an account of which was published in the *Review* for November and December, 1918.

Death of Vice-President Anton A. Raven. Mr. Anton A. Raven, one of the Vice-Presidents of the Society, died on January 15, 1919. At its meeting on January 16, the Council directed that the following minute be entered upon the record:

"Mr. Anton A. Raven, who died January 15th, had been a Fellow of the Society since 1868. He became a member of the Council in 1894 and Vice-President in 1909. During the long period of his connection with the Society his interest in it never flagged. Until advancing years interrupted his attendance, he was most regular at meetings of the Council, and his extensive knowledge and experience in foreign affairs made his advice most acceptable on many occasions. His wide acquaintance amongst men was likewise valuable, and he never grudged the time required for any service for our organization. His kindliness of disposition and courtesy of manner rendered him a most agreeable associate, and his death will be felt by all of his old colleagues.

"*Resolved* that the President be requested to attend the funeral of Mr. Raven as the representative of the Society and that a copy of this minute be sent to his family."

Election of Dr. Porsild to Corresponding Membership. Dr. Morton P. Porsild, Director of the Danish Arctic Station, Disko, Greenland, was elected a Corresponding Member of the Society at the meeting of January 21. Dr. Porsild contributed an interesting article entitled "On 'Savssats': A Crowding of Arctic Animals at Holes in the Sea Ice" to the September, 1918, number of the *Review*.

SOUTH AMERICA

The Bolivian Indian. The entire July, 1918, number (No. 47) of the *Boletín de la Sociedad Geográfica de La Paz* is devoted to a study of the Bolivian Indian.

According to the census of 1900 of the total population (1,816,271) 50.91 per cent was pure Indian, while 26.75 per cent was classified as being of mixed blood and only 12.72 per cent as "white" (the remaining 9.62 per cent being about equally allotted to persons not enumerated and uncivilized Indians). As a matter of fact, it is doubtful if the 12.72 per cent classed as "white" would amount to more than 4 or 5 per cent if all with Indian blood in their veins were excluded. Thus it will be seen that the population of Bolivia is predominantly Indian. In one department, that of La Paz, 75.61 per cent is given as pure Indian and 8.90 per cent *mestizos*, leaving only 8.13 per cent lassified as "white." In this one department the total number of Indians was 333,421. (In the whole of the United States there are 335,998.)

The increasing economic importance of the aboriginal race has awakened new interest in this long-neglected ethnical element. As the erudite Bolivian geographer, Dr. Manuel Vicente Ballivián, says in the introductory paragraphs of the *Boletín*, the leaders of the nation are coming to realize the country's dependence upon the Indian. He carries on all the agriculture, he shepherds the great flocks of sheep, llamas, and alpacas, he supplies almost all the labor for the mines, while as a soldier he is incomparable, because of the great endurance displayed in marches over the high plateau. Moreover it is doubtful if immigrants can ever take his place, since acclimatization to the peculiar conditions of the highlands (8,000-14,000 feet above sea level) is very difficult.

The two principal races of the plateau (the Aymaras and the Quechuas) are described at length in this symposium: their environment, their languages, their character, customs, and religion. One chapter is given to a discussion of the work done by Bandelier in Bolivia. Another treats briefly of the *callahuayas*, the traveling doctors of the Andes, described some time ago in the *Review* (Vol. 4, 1917, pp. 183-196).

Another paper of particular interest is that on the Uros Indians and their language, by Dr. Ballivián, with translations from Brinton. These Indians, now reduced to about 100 souls and rapidly disappearing, Dr. Ballivián considers to have been a subject race brought (perhaps from Asia) by the conquering Aymaras, who passed in succession through North and Central America to establish themselves finally in the region about Lake Titicaca. He believes that the language spoken by the Uros (called Puquina) was probably that of the original Aymara invaders, abandoned by them for the more perfected language of the Tiahuanaco people whom they overcame. When the Aymara civilization in turn fell, the Uros slaves, who still retained the original speech of their masters, escaped to the isolation of the Desaguadero River and the islands of Lake Poopó, where the language was preserved. When the Inca Empire later rose from the ruins of the Aymara culture and established its capital at Cuzco, the first rulers, who probably used what is now called Aymara as their native tongue, retained this as the language of the aristocracy, while the common people, who had in great part used the Yunca (Yungas) speech up to this time, developed a corruption of the Aymara and Yunca languages, thus creating the Quechua. Throughout these changes, however, the Puquina, or Uros, language retained and still retains much of its original character, being still spoken among the small remnant of miserable survivors along the *totora*-covered margins of the Desaguadero.

The Climate of Montevideo. A comparison of data published by Luis Morandi, director of the Instituto Nacional Físico-Climatológico of Montevideo, brings out the following conclusions regarding the climate of the Uruguayan littoral about Montevideo.

The mean annual temperature at Montevideo is given as 16.1° C., the average for the summer months of January and February being 21.9° C., and that for the coldest month, July, being 10.3° C., thus giving 11.6° C. (20.88° F.) as the range of monthly means, a figure that is distinctly that of the temperate zones but somewhat less than would be expected on the leeward coast in 35° latitude (cf. Mark Jefferson: The Real Temperatures Throughout North and South America, *Geogr. Rev.*, Sept. 1918, pp. 240-267).

During the summer the daily range is about 9° C.; in winter it seldom exceeds 4° C. While part of this marked summer range is probably due to the effect of passing cyclonic centers, the alternating influence of warm sunshine and the regular daily sea breeze seems to account for most of it along the coast.

Sudden extreme changes of temperature are common in this part of Uruguay, particularly in spring and summer. An almost instant drop of 11° C. was felt in December, 1905, on this occasion accompanied by a heavy shower and hail. Brusque wind shifts undoubtedly are the cause. The changes are not so severe, however, as upon the Argentine *pampas*, where Davis records sudden drops of temperature of more than 25° C., when the scorching northerly *zonda* is immediately followed by the chill *pampero* (W. G. Davis: The Climate of the Argentine Republic, Buenos Aires, 1902, p. 24). The broad stream of the Río de la Plata, 120 miles wide at Montevideo, tempers the severity of these sudden changes on its eastern shore.

There are no decided rainy and dry seasons at Montevideo, though a rainfall maximum is reached in the autumn (April and May), not in the winter months as is often supposed even by the residents of the city. Winter rains are most frequent, but autumn rains are heaviest. The mean annual precipitation is about 900 millimeters (35.4 inches). Light showers fall at short intervals throughout the year, while heavy rains come with the autumn *tormentas*, or electrical storms from the southwest. It is usually said that it is the *pampero* that brings the heavy rains to Uruguay, but it would seem to be rather the warm easterly winds immediately preceding the passage of a cyclonic center. The *pampero* is a high-pressure outflow corresponding to the cold, dry, northwest wind in the United States, or the "southerly burster" in Australia. Morandi gives the following as the typical order in the passing of a *tormenta:* increasing easterly wind for about 24 hours; heavy rain, lasting for several hours, followed by violent electrical discharges; wind veering to the northeast, strong and gusty; constantly decreasing atmospheric pressure until some 48 hours after beginning of storm; then a sudden shifting of the wind to the west-southwest, still blowing with increasing strength; rapid fall of temperature with the change of wind direction; a gradual increase of pressure and decrease of wind velocity for some 15 hours. This description corresponds to the passing of a cyclonic disturbance. It would seem, however, that many of the frequent summer-time *tormentas* of Uruguay are thunderstorms, convectional and purely local in their character. These do not always bring rain and are seldom accompanied by hail.

Fog observations made in Montevideo are of interest. From May to October heavy fogs are frequent, but seldom last all day on land. This is the season when the cold water from the Antarctic reaches farthest north. Off the coast, just where the lanes of travel converge toward the mouth of the Río de la Plata, dense fogs are sometimes encountered for days at a time, making navigation slow and dangerous. This region corresponds to the Newfoundland coast and the shores of the Japanese island of Yezo, in that it is the meeting place of air and water currents of different temperature. During other months light morning fog banks hang sometimes over the lower parts of the city and country or cling to the scattered groves of trees.

Planetary circulation of the atmosphere is modified along the littoral by well-developed land and sea breezes, especially in the summer season. As there are no barriers to the movement of these air currents their influence is felt far inland. To them Uruguay owes much of the mildness of its seasons.

This coast region along the estuary of the Río de la Plata, with its equable temperature and well-distributed rainfall, has become Uruguay's agricultural district, while her cattle-raising industry occupies the grasslands of the interior, where precipitation is lighter and more uncertain.

(For references see: Normales para el Clima de Montevideo, *Primera Reunión del Congreso Científico Latino Americano, Buenos Aires, 1898,* Vol. 3: *Trabajos de la 2a. Sección: Ciencias Físico-Químicas y Naturales,* pp. 139-164, Buenos Aires, 1899; Síntesis General de los Resultados Obtenidos desde su Fundación y en sus Distintos Secciones y Servicios en el Instituto Nacional Físico-Climatológico del Uruguay, *Proc. 2nd Pan Amer. Sci. Congr.,* Vol. 2, Section 2, pp. 779-824, Washington, 1917; Frecuencia, Cantidad y Modalidades de la Lluvia y del Granizo en Villa Colón (Montevideo) en el Período 1884-1914, *ibid.,* pp. 225-234; meteorological summaries for 1901-05, 1901-13 (in French), and 1901-15, annual meteorological synopses, the *Boletín Mensual,* and other publications of the Instituto Nacional Físico-Climatológico of Montevideo.)

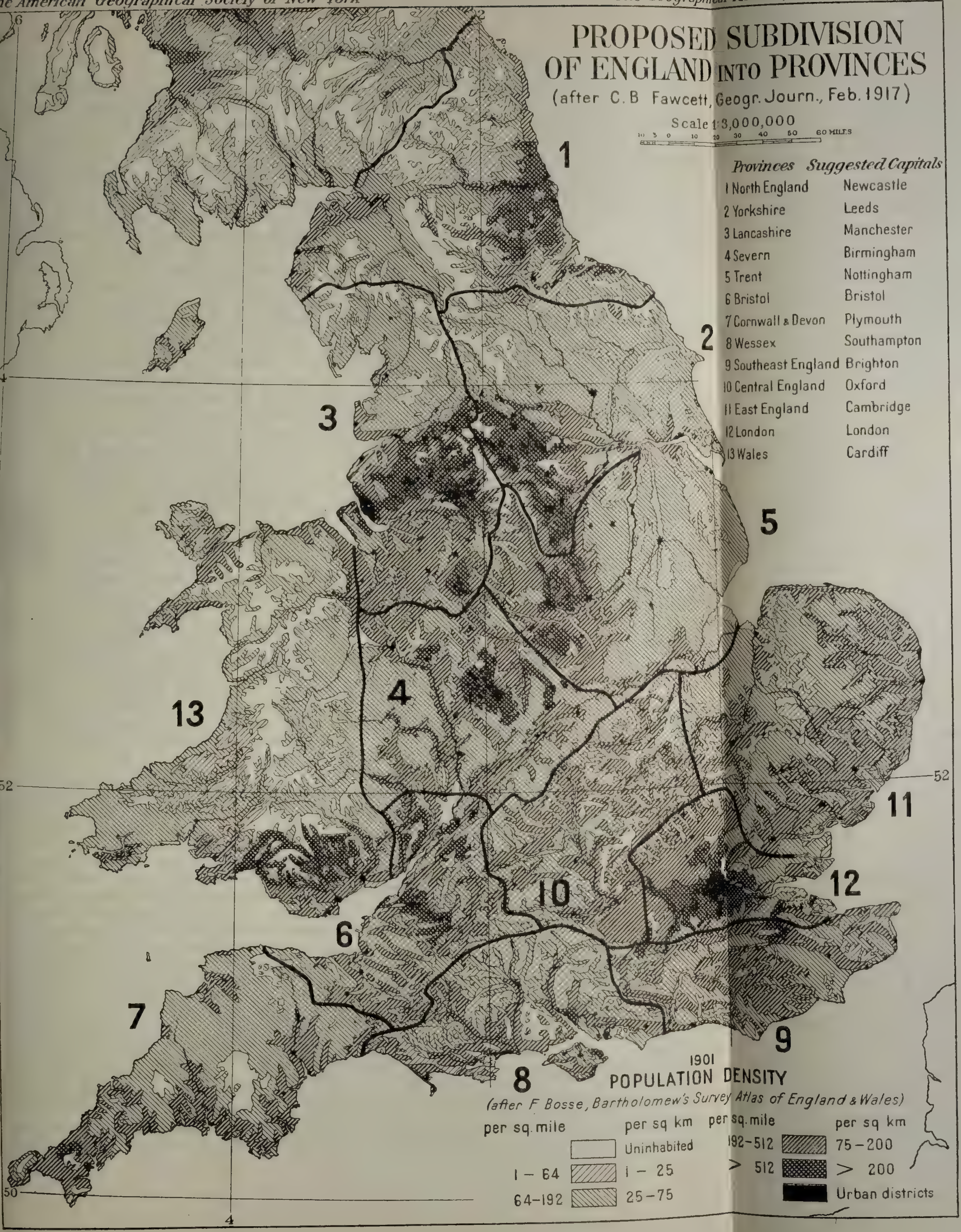
EUROPE

Proposed New Administrative Subdivisions of England, France, and Germany. [With separate map, Pl. II, facing p. 114.] The political and economic reconstruction which the general recasting of values by the war has brought about affects the Allied countries as well as the Central Empires. While in the latter it has ranged to the extreme form—in the case of Austria-Hungary—of complete disintegration, among the former it finds expression in internal re-adjustment. To meet the altered conditions proposals have been made in several countries to change the existing administrative subdivisions. Three such proposals are described herewith, relating to England, France, and Germany.

England. The proposal concerning England has been put forward by C. B. Fawcett in a paper in the *Geographical Journal* for February, 1917 (Natural Divisions of England, with map in 1:2,500,000; see also the abstract in *Ann. de Géogr.* for March 15, 1918, pp. 149-151), in which is presented a subdivision of the country into natural regions as a basis of a satisfactory division into provinces for local self-government. The accompanying insert map in 1:3,000,000 (Pl. II) shows the boundaries of the proposed subdivisions and enumerates the suggested capitals. The boundaries are drawn on the background of the population density of England in 1901; the map should be compared with the original, on which relief is shown in altitude tints. Besides its intrinsic interest the paper is encouraging as a recognition that man *does* live on the earth, that his activities are distributed in regard to it. A statement made in the dis-

The American Geographical Society of New York

The Geographical Review, Vol. VII, No. 2, 1919, Pl. II



PROPOSED SUBDIVISION OF ENGLAND INTO PROVINCES

(after C. B. Fawcett, Geogr. Journ., Feb. 1917)

Scale 1:3,000,000

Provinces	*Suggested Capitals*
1 North England	Newcastle
2 Yorkshire	Leeds
3 Lancashire	Manchester
4 Severn	Birmingham
5 Trent	Nottingham
6 Bristol	Bristol
7 Cornwall & Devon	Plymouth
8 Wessex	Southampton
9 Southeast England	Brighton
10 Central England	Oxford
11 East England	Cambridge
12 London	London
13 Wales	Cardiff

1901 POPULATION DENSITY

(after F. Bosse, Bartholomew's Survey Atlas of England & Wales)

per sq. mile		per sq. km
	☐	Uninhabited
1 – 64	▨	1 – 25
64–192	▨	25 – 75
192–512	▨	75 – 200
> 512	▩	> 200
	■	Urban districts

cussion following the paper, "that the division of England into administrative areas is not a geographical problem," is surely retrograde in this respect.

The geographical principles of division enunciated by Fawcett may be grouped under two main heads: the character of the boundaries, and the need and function of the regional capital. The boundaries must interfere as little as possible with the normal activities of the people; especially is this important in a thickly populated and industrial country. The lines therefore must run along the lines of least population. The carrying into effect of this principle shows a strongly sympathetic relation with an important physical feature; the boundaries follow the watersheds and with certain exceptions avoid cutting across the valleys or following the *talweg*. This involves certain departures from the old administrative districts, the counties that in general are here grouped to form the natural divisions. The counties, however, are heritages from the past when geographical conditions were different. Wiltshire, for example, rose as a unit round the comparatively well-peopled chalk upland of Salisbury Plain. Today its ancient capital (Old Sarum) has disappeared, and the administrative area has little geographical significance. Apart from Wales, where many other factors are concerned and where old controls survive, the chief exceptions to the coincidence of boundary line and water-parting are to be found in the Birmingham district and in southeastern England. The situation of a great city on a watershed is unique, but in the case of Birmingham the physical barrier is not great, while furthermore it is the meeting point of several radial valleys, and, of course, here is a coalfield. In metropolitan England, where again watersheds do not present serious barriers, there are departures from the rule. The question of subdivision here is far less clear than in the industrial sections with their grouped urban populations. Omitting Cornwall and Devon the metropolitan area is dominated by the metropolis, without any considerable counteracting force. This is seen in the relative insignificance of the regional capitals: indeed, in the southeastern province, where metropolitan influence is strongest, it is difficult to suggest a city qualified for such a purpose. Brighton, the largest center, has practically none of the attributes necessary. It may be advisable to group the southeastern section with Greater London.

Just emphasis is laid on the importance of the regional capital. In the well-marked natural geographical—this does not mean purely physical—units regional capitals already exist. Southampton is an excellent example—the natural capital of that region known to geology and physical geography as the Hampshire Basin, to history and literature as Wessex.

Again stress is laid on the encouragement of provincial patriotism as an essential of good local government, the equivalent in a small way of national patriotism. The establishment of such feeling in the provincial units must take into recognition present local county sentiment. In this connection it should be noted that the single present-day county adopted with little change as a unit in itself is Yorkshire, and it cannot be gainsaid that in Yorkshire local pride finds its greatest expression.

France. The proposed subdivision of France is into economic regions; it is being worked out by the Ministry of Commerce according to a recent note by Commercial Attaché P. C. Williams (Division of France into Economic Regions, *Commerce Repts.*, Sept. 30, 1918, pp. 1201-1203). The accompanying map (Fig. 1b) is based on the list of *départements* included in each region which forms part of Mr. Williams's note. In several cases the proposed regions include parts of departments; where a regional boundary does not coincide with a departmental, it is shown by a broken line on the map. There are to be sixteen regions, each grouped about a great trade center. The regions are named after their trade centers (the locations of the latter are shown by city symbols on the map).

This scheme is the practical outgrowth and fruition of the "regionalist" movement in France. This movement has aimed to offset the extreme effects of administrative centralization—while recognizing its special function in the life of France: "*personne ne songe à supprimer le centre de la France; ce serait la frapper au coeur*"—by discarding the division into 87 *départements* and re-subdividing the country into the 15 to 20 regions into which it naturally falls by reason of its topography and its human and economic activities. The chief advocates of this movement have been the late Pierre Foncin, Inspector General of Public Education (see obituary in *Ann. de Géogr.*, Jan. 15, 1917, pp. 67-70), Jean Hennessy, a member of the Chamber of Deputies, and the late Professor Vidal de la Blache, dean of French geographers. M. Foncin's chief work on the subject is "Les Pays de France: Projet de Fédéralisme Administratif," Colin, Paris, 1898. M. Hennessy has recently gathered together his numerous publications on this topic under the title "Régions de France, 1911-1916," Paris, 1916. Professor Vidal de la Blache's writings are a paper in the *Revue de Paris* of December 15, 1910, entitled "Les Régions Françaises" and an introductory chapter entitled "La Relativité des Divisions Régionales" in a symposium of the subject published before the war ("Les Divisions Régionales de la France: Leçons Faites a l'École des Hautes Études Sociales," by various authors, Alcan, Paris, 1913). Other references are: D'Hugues: Essai sur une Nouvelle Division Régionale de la France, *Rev. de Géogr. Commerciale* (Soc. de Géogr. Commerciale de Bordeaux), Vol. 43, 1917, No. 7-12, pp. 348-353; and Henri Hauser: Le Congrès de la Fédération Régionaliste Française, *Ann. de Géogr.*, July 15-Sept. 15, 1918, pp. 374-375. It was through Professor Vidal de la Blache's efforts that the geographic nature of the problem was recognized by those conscious mainly of its administrative aspect and chiefly through him that its solution was found along geographical lines. The best evidence of this is the strong similarity between the project being worked out by the Ministry of Commerce and Professor Vidal de la Blache's own scheme as outlined on the map published in his *Revue de Paris* article (reproduced herewith in Fig. 1a; for facsimile reproduction see Fig. 6 illustrating a section on "French Regional Life and National Unity" in an article on "The Real France" by Emmanuel de Martonne in the March, 1919, *Journ. of Geogr.*).

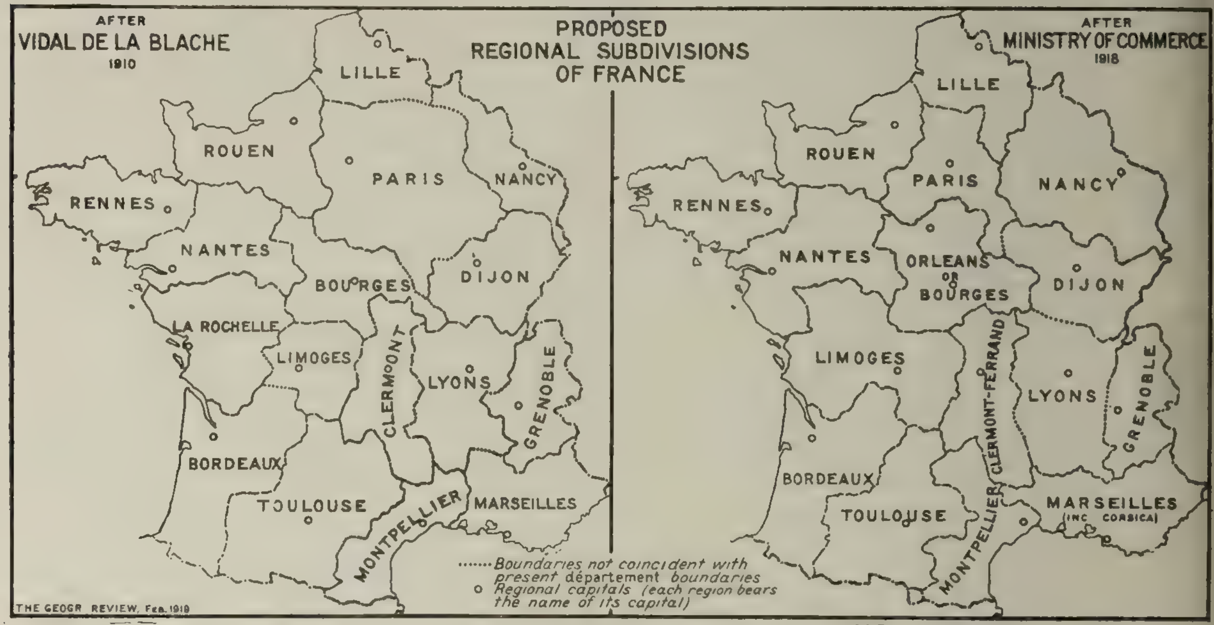


FIG. 1a—Proposed subdivisions of France according to Vidal de la Blache, 1910. Scale, 1:16,500,000.

FIG. 1b—Proposed subdivision of France into economic regions being worked out by the French Ministry of Commerce. Scale, 1:16,500,000.

Germany. The proposed subdivision of Germany presented herewith (Fig. 2) is a cartographic interpretation of an Associated Press despatch from London dated December 22, 1918 (see *New York Times,* December 23, 1918, page 1, column 6), which reported that a Rhenish official, according to a despatch from Dresden, had suggested that the future Germany be subdivided as portrayed. This proposal is here published because of its intrinsic worth and its recognition of the racial subdivisions of the Germans and not because it is the one likely ultimately to be adopted. Indeed more recent despatches (*New York Times,* January 17 and 22, 1919) relating to a draft for a German constitution speak of a division into fifteen units in which equality of population was evidently aimed at, the Berlin and Vienna districts being established as units. A feature which must, of course, be discounted in the present scheme is the retention of ethnically non-German territory in the new state, especially the Polish areas in the east. Here the boundary of the German Confederation of 1815-1866 (shown on Fig. 2 as a shaded band), which excluded the Prussian provinces of Posen, West Prussia, and East Prussia, may prove to have a measure of prophetic significance.

The proposal divides Germany into seven units: Brandenburg-Prussia, Upper Saxony, Lower Saxony, Rhineland, Swabia, Bavaria, and German Austria. It will be noted that German Austria is included in the new Germany, and that German Lorraine has been excluded, but Alsace not; also that northern Schleswig, which is ethnically Danish, the southern Tyrol, which is inhabited by Italians, and southeasternmost Carinthia and southern Styria, which are Slovene, have been included (cf. Fig. 2, where ethnic boundaries are shown by dotted lines).

Aside from these infractions of the "principle of nationality" the proposal, as has been said, recognizes the main ethnic subdivisions of the Germans; their marked ndividuality and their function in the life of the nation are well known. On Figure 2 their limits are indicated by fine dotted lines and the names of the *Stämme,* or stocks, in hair-line lettering, thus: (1) Low Germans, consisting of Lower Saxons and Prussians; (2) Middle Germans, consisting of Franks, Thuringians-Upper Saxons, and Lusatians-Silesians; (3) High Germans, consisting of Alemannians (i. e. Alsatians, Badenese,

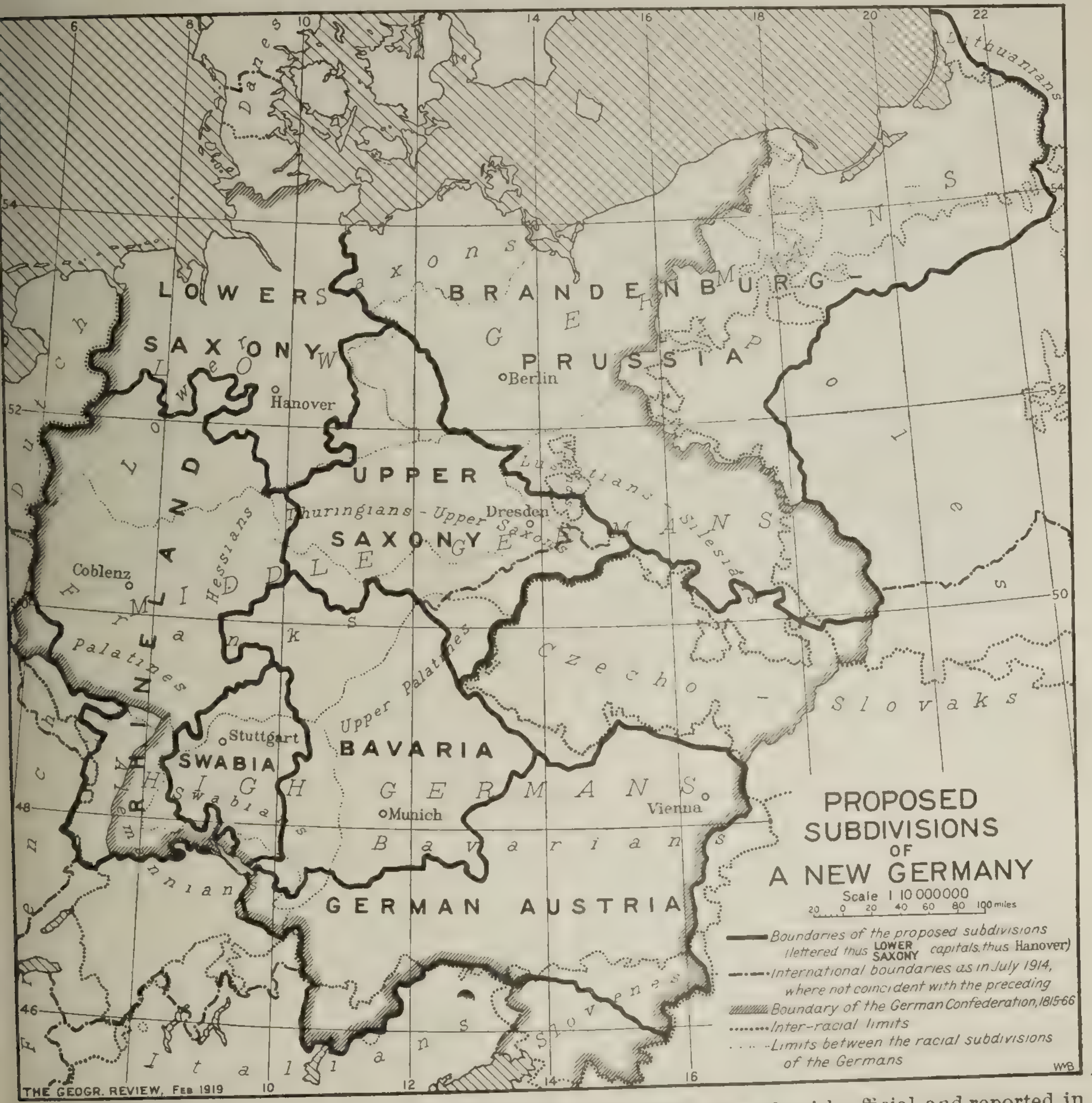

LOWER SAXONY
BRANDENBURG-PRUSSIA
UPPER SAXONY
RHINELAND
SWABIA
BAVARIA
GERMAN AUSTRIA
Hanover
Berlin
Dresden
Coblenz
Stuttgart
Munich
Vienna
Danes
Lithuanians
Poles
Czecho-Slovaks
Slovenes
Italians
Saxons
Thuringians - Upper Saxons
Lusatians
Silesians
Hessians
Palatines
Upper Palatines
Swabians
Bavarians
Alemannians
LOW GERMANS
MIDDLE GERMANS
HIGH GERMANS
PROPOSED SUBDIVISIONS OF A NEW GERMANY
Scale 1:10 000000
20 0 20 40 60 80 100 miles
Boundaries of the proposed subdivisions (lettered thus LOWER SAXONY capitals thus Hanover)
International boundaries as in July 1914, where not coincident with the preceding
Boundary of the German Confederation, 1815-66
Inter-racial limits
Limits between the racial subdivisions of the Germans
THE GEOGR. REVIEW, FEB 1919
WB

FIG. 2—Proposed subdivisions of a new Germany as suggested by a Rhenish official and reported in press despatches under date of December 22, 1918. Scale, 1:10,000,000. The proposal is here published because of its intrinsic worth and not because it is the one likely ultimately to be adopted.

and German Swiss), Swabians, and Bavarians (in the ethnic sense, i. e. including the German Austrians). (For maps showing the ethnic subdivisons of the Germans, see: (1) Ethnographic map of Central Europe, 1:9,000,000, Pl. 31, Andree's Handatlas, 6th edit., Leipzig, 1914; (2) Ethnographic map of the Germans, 1:7,000,000, accompanying O. Weise: Die deutschen Volksstämme und Landschaften (series: Aus Natur and Geisteswelt), Leipzig, 1911; (3) Verbreitung der Deutschen in Mitteleuropa, 1:6,000,000, between pp. 4 and 5 of Vol. 1 of Hans Meyer's "Das Deutsche Volkstum," 2 vols., Leipzig, 1903 [shows only subdivision into High, Middle, and Low Germans, but in addition pigmentation and head form]; (4) Karl Ludwig: Heimatskarte der deutschen Literatur [i. e. Karte der deutschen Mundarten], 1:4,000,000, Vienna, 1905 (?); (5) Volkstämme und deutsche Mundarten, 1:7,000,000, in Justus Perthes' Staatsbürger-Atlas, edit. by Paul Langhans, 4th edit., Gotha, 1904.) The proposal broadly reflects these subdivisions or at least does not run contrary to them. In one point it might possibly be improved, namely by the addition of Westphalia to Lower Saxony; this would conform more closely to the ethnic conditions and would possibly be fairer in that it would not allot to one unit the whole Rhenish-Westphalian industrial district. A point of interest is that the proposed new Germany as thus constituted would just fall short of an outlet to the Adriatic, while even the German Confederation had insured to itself this access, although across Slovene territory, to the southern sea.

GEOGRAPHICAL NEWS

Resumption of Publication of the Bulletin of the Mexican Geographical Society. After an interruption of more than two years, due no doubt to the unsettled conditions of the country, the *Boletín de la Sociedad Mexicana de Geografía y Estadística* has resumed publication. The seventh, eighth, and ninth numbers (Quinta Epoca—Tomo VII) have been received. Reference to some of the articles in these numbers will be found among the bibliographical items in the forthcoming issues of the *Review*.

Señor Jesús Galindo y Villa, the well-known professor of archeology and for several years past Director of the Museo Nacional de Arqueología, Historia, y Etnología, has been elected Director of the Society, taking the place of Señor Enrique Santibáñez, who is now in United States. The new editor of the *Boletín* is Señor Ignacio B. del Castillo.

PERSONAL

MR. HERBERT L. BRIDGMAN of the Brooklyn *Standard Union* was elected an Honorary Fellow of the American Museum of Natural History at the meeting of the trustees on February 3. This action was taken partly in recognition of the services rendered by Mr. Bridgman on a number of the Museum's most important exploration committees.

DR. ALFRED C. LANE of Tufts College conducted a conference on "The Geography of the Warring Nations" at the Brooklyn Institute of Arts and Sciences on January 18.

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

UNITED STATES

South-Central States

Crane, V. W. **The Tennessee River as the road to Carolina: The beginnings of exploration and trade.** *Mississippi Valley Hist. Rev.*, Vol. 3, 1916, No. 1, pp. 3-18. Cedar Rapids, Iowa.

This paper is of geographic interest in that it shows an interesting response to the Tennessee River as a trading route, a route leading from the Mississippi along the Tennessee and through interlocking tributaries to the eastward-flowing rivers of the Carolinas. Furthermore the paper shows the uncertainty of assuming the importance of a route merely because the route is feasible, for other factors, not geographical, may interplay to prevent the expectable geographic response.

Apparently the French traders of the Mississippi Valley first appreciated the importance of the Tennessee route, and in 1701 we find the earliest description of this easy route which compelled a portage of only a league and half. The English route from South Carolina at this time was overland and skirted the Southern Appalachians across the Piedmont and Coastal Plain to the Chickasaw country. French traders of the Mississippi Valley dreaded the competition of this easy route for it would divert much of the fur trade from them to the English traders of the Atlantic seaboard. The French traders therefore strengthened their influence over the Indians by establishing missions and trading posts with the result that it was nearly a century before the Tennessee route came into active use.

F. V. Emerson

Foster, J. H. **The spread of timbered areas in central Texas.** *Journ. of Forestry*, Vol. 15, 1917, No. 4, pp. 442-445.

Mr. J. H. Foster, State Forester of Texas, points out a somewhat surprising change in the forest growth of the south-central part of the state. This region is the Edwards Plateau, a deeply eroded limestone area forming the southern extension of the Great Plains. The forest growth of the plateau occurs in three principal situations: along streams and canyons, on hills and bluffs, and on the prairie. Tree growth has probably long been present on the first two, judging by the large specimens found there. In the canyons bald cypress like that of the southern swamps several feet in diameter is found, burr oak of five feet, and live oak and pecans nearly as large. On rough slopes where erosion is rapid the mountain cedar and mountain oak grow in close stands and thickets. Cedar is extensively cut and transported for poles. Finally, in spite of scanty rainfall, the true grassland has been attacked by mesquite and other low tree growth. The author concludes that this would have been the case long ago if it had not been for the Indians' practice of burning over the land repeatedly. Under the white man this custom has disappeared, giving trees a chance to spring up. The change occurs most rapidly in the scanty grass of overgrazed areas. Mr. Foster observes that while there is a remote possibility of loss from the destruction of grazing land by this spread of the timber, more important still are the benefits of partial shade for stock, abundance of fuel wood and posts for the farmer, and the protection afforded by the trees to the soil and the water supply.

R. H. Jones

Ashley, G. H. **The Santo Tomas cannel coal, Webb County, Texas.** Pp. 251-270; maps, diagrs., ills. *U. S. Geol. Survey Bull. 691-I*, Washington, D. C., 1918. [Probably the largest deposit of bituminous cannel coal in the United States if not in the world.]

Cline, I. M. **Temperature conditions at New Orleans, as influenced by subsurface drainage.** Map, diagr., bibliogr. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 481-496 (discussion, pp. 494-496). Washington, D. C., 1917.

COTTERILL, R. S. **History of pioneer Kentucky.** iv and 254 pp.; maps, index. Johnson & Hardin, Cincinnati, 1917. $2.00. 9 x 6.

EMERSON, F. V. **Loess-depositing winds in Louisiana.** Map, diagrs., ill. *Journ. of Geol.,* Vol. 26, 1918, No. 6, pp. 532-541.

HEALD, K. C. **Geologic structure of the northwestern part of the Pawhuska quadrangle, Oklahoma.** Pp. iv and 57-100; maps, diagrs. *U. S. Geol. Survey Bull. 691-C.* Washington, D. C., 1918.

LAMOREE, J. K. **Texas twisters, Western counterparts of the Sahara sandstorms: Their origin and their ending.** Ills. *Travel,* Vol. 28, 1917, No. 5, p. 31. New York.

LEONARD, W. E. **Migratory tenants of the Southwest.** Ills. *Survey,* Vol. 35, 1916, Jan. 29, pp. 511-512. [The farming population of the Southwest includes a large class of unsuccessful and hence migrant tenant farmers, composed apparently of two groups of unfortunate survivals. The one group pertains to an original weakling colonial stock; the other owes its origin to the dark days of the reconstruction period following the Civil War.]

PIERCE, F. C. **A brief history of the lower Rio Grande valley.** 200 pp.; maps, ills. George Banta Publ. Co., Menasha, Wis., 1917. $1.25. 6½ x 5.

POGUE, J. E. **Sulphur: An example of industrial independence (The mineral industries of the United States).** 10 pp.; diagr., ills. *U. S. Natl. Museum Bull. 102, Part 3.* Smithsonian Inst., Washington, D. C., 1917. [''Two sulphur deposits near the Gulf coast in Louisiana and Texas, worked by an ingenious and efficient mechanical process, not only are supplying practically all of the crude sulphur in this country, but their development has shifted the world's largest sulphur industry from Sicily to the United States.'']

ROGERS, G. S. **Intrusive origin of the Gulf Coast salt domes.** Diagrs., ills. *Econ. Geology,* Vol. 13, 1918, No. 6, pp. 447-485.

SHULER, E. W. **The geology of Camp Bowie and vicinity.** 14 pp.; diagr., ills., bibliogr. *Bull. Univ. of Texas No. 1750,* Austin, Texas, 1917. [Topographical similarities with much of the western front of the European battle ground—*cuesta* topography—give this Texan camp an unusually interesting situation.]

SWANTON, J. R. **An early account of the Choctaw Indians.** *Memoirs Amer. Anthropol. Assoc.,* Vol. 5, 1918, No. 2, pp. 53-72. Lancaster, Pa.

TROUT, L. E., AND G. H. MYERS. **Bibliography of Oklahoma geology with subject index.** 105 pp. *Oklahoma Geol. Survey Bull. No. 25.* Norman, 1915.

UDDEN, J. A., C. L. BAKER, AND EMIL BÖSE. **Review of the geology of Texas.** xi and 164 pp.; maps, index. *Bull. Univ. of Texas No. 44.* Austin, 1916. [Areas in Texas geologically mapped prior to 1915 are charted. The total area covered by maps in fair detail and by reconnaissance and exploratory maps amounts to a little over two-thirds of the state: the first class of maps, however, only amounts to about one twenty-fifth of the total area.]

VERHOEFF, MARY. **The Kentucky River navigation.** 255 pages; maps, ills., bibliogr., index. *Filson Club Publ. No. 28.* John P. Morton & Co., Louisville, Kentucky, 1917. [That the improvement of the Kentucky River under the present conditions is a waste of money, labor, and engineering skill and that the need in the upper basin of the river is no longer for improved streams but for well-made roads leading to the railroad stations are conclusions which Miss Verhoeff has reached after a careful historical study of the attempts to change the Kentucky River into a waterway. The book covers a period of over a hundred years and offers a serious study of the changing traffic problems of a great river basin.—ROBERT M. BROWN.]

WALLIS, B. F. **The geology and economic value of the Wapanucka limestone of Oklahoma, with notes on the economic value of adjacent formations.** 102 pp.; map, diagrs., ills., bibliogr. *Oklahoma Geol. Survey Bull. No. 23.* Norman, 1915. [Chapter 1 contains a discussion of the physiographic provinces of Oklahoma, with a new division into nine provinces, shown on a map.]

SELLIER, L. M. ***Preliminary [geological] map of Kentucky.*** 1 in. :10 miles (1:633,600). Kentucky Geol. Survey, Frankfort, 1917.

—— *[Topographic map of the United States.]* Sheets: (1) ***Gantts Quarry, Ala.,*** 1:62,500; (2) ***Prestonsburg, Ky.,*** 1:62,500; (3) ***Williamson, Ky.-W. Va.,*** 1:62,500; (4) ***Vicks-***

urg, Miss.-La.,* 1:62,500; (5) ***Addicks,*** 1:31,680, (6) ***Agua Fria,*** 1:62,500, (7) ***Barwise*** ***chool,*** 1:31,680, (8) ***Bone Spring,*** 1:62,500, (9) ***Buck Hill,*** 1:62,500, (10) ***Cypress,*** 1:31,680, 11) ***Dryden Crossing,*** 1:62,500, (12) ***Electra,*** 1:31,680, (13) ***Hood Spring,*** 1:62,500, (14) ***ndian Wells,*** 1:62,500, (15) ***Iowa Park,*** 1:31,680, (16) ***Jordan Gap,*** 1:62,500, (17) ***Nine*** ***oint Mesa,*** 1:62,500, (18) ***Reagan Canyon,*** 1:62,500, (19) ***Santiago Peak,*** 1:62,500, (20) ***ascotal Mesa,*** 1:62,500, (21) ***West Wichita Falls,*** 1:31,680, ***Texas;*** (22) ***Burkburnett,*** :31,680, (23) ***Clara,*** 1:31,680, ***Texas-Okla.*** U. S. Geol. Survey, Washington, D. C., 1917, 918. [Agua Fria, Buck Hill, and Jordan Gap, Texas, surveyed in co-operation with the War Department.]

SOUTH AMERICA

Paraguay, Uruguay, Argentina, Chile

Berne, Pierre. **L'immigration européenne en Argentine.** 242 pp.; bibliogr. Marcel Rivière & Cie, Paris, 1915. 10 x 6½.

Dr. Berne portrays the Argentine as the New World land of greatest immigration after the United States—a long way after.

The Argentine government has at all times fostered this immigration, even paying fares and premiums to collecting agents in Europe, though recognizing early the unwisdom of this course, which it has long definitely abandoned; but, working against the stream of immigration, is a steady outflow from the country of the same European wanderers, some as seasonal birds of passage and others leaving to return no more. The magnitude of these outward currents causes anxiety to those who desire to see the land peopled with workers of European race and habits, for these migrants have not found their trial of the New World satisfying. The annual migration of harvest hands is partly due to astronomical causes, in that the position of the Argentine in the southern hemisphere makes it possible for Italian harvesters, like Italian opera singers, to put in two successive working seasons each year, discouraging permanent settlement in the new world of the south.

''British money and Italian hands have made the modern progress of the Argentine,'' he quotes. The Italians are the most numerous, though not the most desirable, of the newcomers. They are mostly ignorant, willing to live on a very low scale and to perform the meanest tasks. Yet of late they have shown a tendency to monopolize retail trade, once widely in the hands of Frenchmen. There are far fewer of these in the land than of Italians, but one may concede absolutely the author's claim that they are socially much more desirable citizens. They are better educated, they more often bring capital to the country, they have a much higher standard of living, and they constitute a gain to Argentine society not to be measured merely by their numbers. Economically it is difficult for them to compete with the Italians precisely on account of their better scale of living. The wine industry of Mendoza, wholly French in its beginnings, has now become almost wholly Italian, to the detriment of the product.

The few English in the country are significant because they are engineers or representatives of great capital that has developed the system of transportation. Their investments are variously estimated at from £350,000,000 to £500,000,000.

The Spanish, who are now a strong numerical element in the immigration, are industrious but humble workers. The Basques are welcome, being laborious, thrifty, and prosperous. The list of immigrant nationalities is completed by the undesirable Jews and Syrians, who crowd the cities and live by the peddler's pack, and the Germans. Like the English, the Germans are few in number but of disproportionate significance on account of their commercial activity and especially their facility in adopting the language and manners of the ruling classes. The Germans therefore are successful and well liked. Their wares may be of indifferent quality, but they are cheap and in growing demand.

Space is given to the methods by which the immigrant may obtain land, the difficulty offered by the large estates, and the lack of easy access to much good country. Mr. Berne's volume is very readable and singularly free from national bias.

Mark Jefferson

Albes, Edward. **Montevideo, the city of roses.** Ills. *Bull. Pan Amer. Union,* Vol. 45, 1917, No. 4, pp. 435-463. [Spanish version in *Bol. Unión Panamericana,* Vol. 45, 1917, No. 6, pp. 725-753.]

Alvarez, H. H. **Aguas termominerales de Villavicencio (Prov. de Mendoza).** 30 pp.; map, diagr., ills. *Bol. Direcc. Gen. de Minas, Geol. e Hidrol. No. 10, Ser. D* (*Química Min. y Aguas Min.*), Minist. de Agric., Buenos Aires, 1918.

Barnabe, J. F. **Los yacimentos minerales de la Puna de Atacama.** 63 pp. maps, diagrs., ills. *Anal. Minist. de Agric.: Sección Geol., Mineral. y Minería,* Vol. 1 No. 5. Direcc. Gen. de Minas, Geol. e Hidrol., Buenos Aires, 1915.

Bazzano, Hamlet. **Río de la Plata—generalidades—influencias meteorológicas** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 2, Section 2 Astronomy, Meteorology, and Seismology, pp. 234-239. Washington, D. C., 1917.

Beck, R. H. **Bird photographing on the Falkland Islands.** Ills. *Amer Museum Journ.,* Vol. 17, 1917, No. 7, pp. 429-460.

Beck, R. H. **Narrative of a bird quest in the vicinity of Cape Horn.** Ills *Amer. Museum Journ.,* Vol. 18, 1918, No. 1, pp. 5-24; No. 2, pp. 111-119.

Bonarelli, Guido. **Tierra del Fuego y sus turberas.** 119 pp.; maps, diagrs., bibliogrs. *Anal. Minist. de Agric.: Sección Geol., Mineral. y Minería,* Vol. 12, No. 3. Direcc. Gen. de Minas, Geol. e Hidrol., Buenos Aires, 1917. [Acuteness of the fuel situation in Argentina has stimulated wide research for native fuels. Oil fields have been indicated along the border of the Cordillera in Salta, Mendoza, and Neuquen. Prospecting for coal has been active in San Juan, Neuquen, and Chubut. Attention has been directed towards the peat beds of Tierra del Fuego, first remarked in scientific literature by Darwin. In 1916 the Ministry of Agriculture sent there an expedition, the results of which form the subject of this report. In the report the geology, climate, and flora of the region are discussed separately, and these sections with their bibliographies have a usefulness apart from the special subject to which they relate; so also have the three maps on the scale 1:2,000,000 showing geology, phytogeography, rainfall, and distribution of peat deposits. The various types of peat deposits are described. Some of them appear to be of considerable thickness and extent and suitable for exploitation, but on this the report speaks only tentatively.]

Cardoso, Aníbal. **Buenos Aires en 1536.** 64 pp.; maps, diagr. Juan A. Alsina, Buenos Aires, 1911. 11 x 7½.

—— **Chile: General descriptive data.** 31 pp.; maps, ills. Pan American Union, Washington, D. C., 1916.

—— **Chile, Recopilación de sumas de agua caída en, 1849-1915.** Introduction by Cárlos Henriquez. 101 pp.; diagrs. *Inst. Meteorol. y Geofísico de Chile Sección Lluvias Publ. No. 20.* Santiago de Chile, 1917.

Clayton, H. H. **The Argentine weather service.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 738-742 (discussion, pp. 741-742). Washington, D. C., 1917.

Corti, Hércules. **Las aguas de las termas de Rio Hondo (Provincia de Santiago del Estero).** 34 pp.; maps, diagrs., ills. *Bol. Direcc. Gen. de Minas, Geol. e Hidrol. No. 9, Ser. D (Química Min. y Aguas Min.),* Minist. de Agric., Buenos Aires, 1918.

Debenedetti, Salvador. **Las ruinas prehispánicas de El Alfarcito.** Map, diagr., ills. *Bol. Acad. Nacl. de Ciencias en Córdoba (República Argentina),* Vol. 23, 1918, No. 2a, pp. 287-318. Córdoba.

Ducloux, E. H. **Termas de Inti (agua caliente) en la provincia de Salta.** Map, diagrs., ills. *Bol. Acad. Nacl. de Ciencias en Córdoba (República Argentina),* Vol. 23, 1918, No. 2a, pp. 263-286. Córdoba.

Guerra, J. G. **La soberanía chilena en las islas al sur del Canal Beagle.** 416 pp.; maps. Imprenta Universitaria, Santiago de Chile, 1917. 9½ x 6½. [Abstracted in the *Review,* Vol. 5, 1918, pp. 146-147.]

—— **Iles Malouines en 1765, Une description des.** *Rev. de l'Hist. des Colonies Françaises,* Vol. 4, 1916, No. 4, pp. 490-492. Paris. [Falkland Isles (review of H. Bourde de la Rogerie: Lettre du curé de la colonie française des Iles Malouines, 22 avril 1765, *Journ. Soc. des Américanistes de Paris,* Vol. 11 (N. S.), 1914, pp. 213-216).]

Kantor, M. **Recherches océanographiques sur le littoral maritime de la province de Buenos Aires.** Maps, diagr., ills., bibliogr. *Anal. Soc. Científica Argentina,* Vol. 86, 1918, No. 1-2, pp. 85-117. Buenos Aires.

Knoche, Walter. **Resumen de la organización del servicio meteorológico [de Chile].** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 730-735. Washington, D. C., 1917.

Kühn, Franz. **Die patagonischen Häfen Argentiniens.** Maps, ills. *Zeitschr. Deutschen Wiss. Vereins zur Kultur- und Landes-Kunde Argentiniens,* 1915, No. 2, pp. 65-80. Buenos Aires.

Marstrander, Rolf. **Bibliografía de la geología, mineralogía, y paleontología de la República Oriental del Uruguay.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 8, Section 7: Mining, Metallurgy, Economic Geology, and Applied Chemistry, pp. 659-674. Washington, D. C., 1917.

Marstrander, Rolf. **Preliminary report on the mineral resources of Uruguay.** Maps. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 8, Section 7: Mining, Metallurgy, Economic Geology, and Applied Chemistry, pp. 621-658. Washington, D. C., 1917.

Martínez, A. B. **Baedeker of the Argentine Republic, including also parts of Brazil, the Republic of Uruguay, Chili, and Bolivia.** 4th edit. xviii and 479 pp.; maps, ills., index. D. Appleton & Co., New York and London, 1916. $3.00. 7 x 5.

Mato, Silvestre. **Métodos seguidos, resultados obtenidos, organización y fines del Servicio Geográfico Militar del Uruguay.** *Proc. 2nd Pan Amer. Sci. Congr. Dec. 27, 1915, to Jan. 8, 1916,* Vol. 2, Section 2: Astronomy, Meteorology, and Seismology pp. 319-322. Washington, D. C., 1917.

Miranda, F. P. **El estuario del Plata.** Bibliogr. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 6, Section 5: Engineering, pp. 349-362. Washington, D. C., 1917. [Navigation.]

EUROPE

Italy

De Filippi, Filippo. **The geography of the Italian front.** Map, ills. *Geogr. Journ.,* Vol. 51, 1918, No. 2, pp. 65-77 (discussion, pp. 75-77).

De Fiore, O. **Il periodo eruttivo iniziatosi al Vesuvio nel 1913.** *Riv. Geogr. Italiana,* Vol. 23, 1916, No. 8, pp. 320-326; No. 9, pp. 384-396. Florence.

Del Zanna, Pietro. **Il fattore geografico nel problema meridionale.** Bibliogr. *Boll. Reale Soc. Geogr. Italiana,* Vol. 6, 1917, No. 1, pp. 27-57; No. 2-3, pp. 173-194; No. 4-5, pp. 289-335. Rome.

De Magistris, L. F. **Le ragioni e le vicende della cartografia privata in Italia.** *La Geografia,* Vol. 5, 1917, No. 9-10, pp. 362-391. Novara.

De Stefani, Carlo. **I dintorni di Equi nelle Alpi Apuane.** *Riv. Geogr. Italiana,* Vol. 23, 1916, No. 4-5, pp. 194-201; No. 6-7, pp. 262-268. Florence.

Eredia, Filippo. **Aviazione e meteorologia: Prolusione tenuta al Collegio Romano il 1° settembre 1916 per l'inaugurazione della Scuola Civile d'Aeronautica.** 14 pp. Reprint from *Conferenze e Prolusioni,* No. 19, 1916, Oct. 1. Rome.

Eredia, Filippo. **Le variazioni del clima in Italia.** Diagrs. *Atti X Congr. Internaz. di Geogr., Roma, 1913,* pp. 792-813. Reale Società Geografica, Rome, 1915. [Thermal variations in the period 1866-1910.]

Giandotti, M. **Sulla ricerca delle precipitazioni nell'alta montagna e sul funzionamento dei pluvionivometri totalizzatori nell'alto bacino del Po.** 27 pp.; ills. Ufficio Idrografico del Po, Minist. dei Lavori Pubblici, Parma, 1918.

Giuffrida-Ruggeri, V. **The origins of the Italian people.** *Amer. Journ. of Phys. Anthropol.,* Vol. 1, 1918, No. 3, pp. 317-328. Washington, D. C.

Gortani, Michele. **I fiumi di tipo friulano e il loro profilo d'equilibrio.** Diagrs. *Atti X Congr. Internaz. di Geogr., Roma, 1913,* pp. 936-941. Reale Società Geografica, Rome, 1915.

Kranz, W. **Hohe Strandlinien auf Capri.** Map, ills., bibliogr. *Jahresbericht der Geogr. Gesell. zu Greifswald,* Vol. 13, 1911-12, pp. 1-17. Greifswald, 1913.

Laeng, Gualtiero. **La Cima Tosa (3173 m.) (Dolomiti di Brenta—Alpi Trentine).** *Riv. Mensile Club Alpino Italiano,* Vol. 35, 1916, No. 7, pp. 172-182. Turin.

Marinelli, Olinto. **Fenomeni carsici nelle regioni gessose d'Italia.** Maps, diagrs., ills. (Materiali per lo studio dei fenomeni carsici, III.) *Memorie Geogr. (Suppl. to Riv. Geogr. Italiana) No. 34* (= Vol. 11, pp. 263-416). Florence, 1917.

NOVARESE, VITTORIO. **Gli stadi postwürmiani nella Valle d'Aosta.** Map. *La Geografia,* Vol. 4, 1916, No. 2-3, pp. 73-85. Novara.

PRELLER, C. S. DU R. **The Ruitor glacier lakes (Piedmontese Alps).** Maps, diagr., ills. *Scottish Geogr. Mag.,* Vol. 34, 1918, No. 9, pp. 330-342.

ROHE, ALICE. **Our littlest ally.** Ills. *Natl. Geogr. Mag.,* Vol. 34, 1918, No. 2, pp. 138-163. [A description of San Marino, the smallest and oldest republic in the world.]

ROLETTO, G. B. **Ricerche antropogeografiche sulla val Pellice.** Maps, diagrs., ills. *Memorie Geogr.* (*Suppl. to Riv. Geogr. Italiana*) *No. 35* (= Vol. 12, pp. 1-124.) Florence, 1918.

SALLIOR, P. **La valeur économique du Frioul.** *La Nature,* No. 2334, 1918, June 22, pp. 397-399.

STELLA, AUGUSTO. **Studii sulla idrologia sotterranea della pianura del Po.** xi and 151 pp.; maps, diagrs. *Memorie Descrittive della Carta Geologica d'Italia,* Vol. 17. R. Ufficio Geologico, Rome, 1915.

TOLOMEI, ETTORE. **Prontuario dei nomi locali dell 'Alto Adige.** Maps. *Memorie della Reale Soc. Geogr. Italiana,* Vol. 15, Part I, pp. 1-140. Rome, 1916.

VANNI, MANFREDO. **La Valganna.** Maps, diagrs., ills., bibliogr. *Boll. Reale Soc. Geogr. Italiana,* Vol. 6, 1917, No. 1, pp. 9-26; No. 2-3, pp. 157-172. Rome.

—— **Venezia Giulia, Prontuario dei nomi locali della.** Map, diagr. *Memorie della Reale Soc. Geogr. Italiana,* Vol. 15, Part II, pp. 143-300. Rome, 1917.

WARD, R. DEC. **Weather controls over the fighting in the Italian war zone.** *Scientific Monthly,* Vol. 6, 1918, No. 2, pp. 97-105.

—— ***Fronte Italiana, La, tra Brenta e Piave.*** [Additional title on cover: Grande Carta topografica in 2 fogli a colori alla scala di 1:100,000 con le comunicazioni ferroviarie, tramviarie, stradali e le distanze per itinerari automobilistici e ciclistici. Prima edizione autorizzata.] 1:100,000. Istituto Geografico De Agostini, Novara, [1918].

AUSTRALASIA AND OCEANIA

AUSTRALIA, NEW ZEALAND

FLETCHER, C. B. **The new Pacific: British policy and German aims.** With a preface by Viscount Bryce and a foreword by W. M. Hughes. xxxiii and 325 pp.; map, ills., index. Macmillan & Co., Ltd., London, 1917. $3.00. 8 x 5.

Germany's possessions in the southern Pacific were seized early in the war and have since been administered successfully by Australasian officials. It is not surprising that the people of Australia and New Zealand "have begun to think of them now as British" and that the "New Pacific" is the Pacific without Germany. Beyond this emphatic expression the author is less concerned with proposals for future policy in the region than with tracing the growth of the problems and responsibilities that have developed during the last sixty years. These, it might be said, are all aspects of the fundamental question of the white man's occupation of the tropics.

A nearly empty continent with room for 100,000,000 people lies at the doors of Asia. One-third of it is north of the Tropic of Capricorn; here a white Australia is maintained at heavy cost; its ultimate success yet remains to be proved. An example of its cost is seen in the high tariff on bananas, which otherwise might be imported cheaply from Fiji and Papua; and at the same time Papua, where the planter needs every encouragement, is being subsidized by the Commonwealth Government! Tropical Australia suffers from lack of population; New Guinea and the archipelagoes from inability to direct the populace to labor. The problem of inducing the native to work is particularly acute in the areas where coconuts are plentiful. Recent progress in the Fiji Islands has been small compared with its potentialities. Most of the late prosperity has been due to the sugar plantations, and these are cultivated by coolie labor from India. The indenture system is not favorably regarded in India; but, if the coolie goes, from whence will labor be supplied? The Fijians, secured in possession of their lands, do not wish to work. Exceptional in this respect are the German Solomon Islands. The British members of the group are less favorably situated, but it is argued that if the group is united labor will then "go round." In New Guinea, both British and German, the problem is further complicated by the large areas yet unexplored; there s little more than a fringe of occupation in this large and important territory. Altoether, as Mr. Fletcher says, "Only those actually living in the Pacific at this end now how much remains to be done and what vast responsibilities await the coming ay of peace."

Scott, Ernest. **A short history of Australia.** xx and 363 pp.; maps, bibliogr., index. Humphrey Milford and Oxford University Press, London, etc., 1916. 7½ x 5.

This "Short History of Australia" begins with a blank space on the map and ends ith a record of a new name on the map, that of "Anzac." It adds another volume to he constantly growing list of excellent books that are coming from the continent of ontrasts. The history of Australia is always fascinating. Further, it is of especial nterest to an American, whose own country's history so nearly parallels it.

This handy volume is written attractively and, one is convinced at every point, with accuracy. There is frankness of statement when historic records are doubtful. Interpretations throughout are seemingly without any bias.

Bibliographical notes contain an excellent list of references and supplementary material which the reader is encouraged to seek. Reproductions of early maps and maps of the present day illustrating the unveiling of the vast Australian continent complete this excellent treatise.

Eugene Van Cleef

Armstrong, H. E. **The visit of the British Association to Australia.** Maps, diagr., ills. *Proc. Royal Inst. of Great Britain,* No. 109, Vol. 21, Part II, 1917, pp. 335-356. [General observations on the geography of Australia.]

—— **Australian irrigation scheme, An, compiled from official sources.** Map. *Indian Journ. of Economics,* Vol. 2, 1918, Part II, July, pp. 265-276. Allahabad.

Basedow, Herbert. **Narrative of an expedition of exploration in northwestern Australia.** Map, ills. *Proc. Royal Geogr. Soc. of Australasia, South Australian Branch, Sess. 1916-17,* Vol. 18, 1918, pp. 105-295. Adelaide.

Benson, W. N. **The geology and petrology of the great serpentine belt of New South Wales. Part VI: A general account of the geology and physiography of the western slopes of New England.** Maps, diagrs., ills., bibliogr. *Proc. Linnean Soc. of New South Wales,* No. 166, Vol. 42, Part II, 1917, pp. 223-245, 250-283. Sydney.

Berry, S. S. **Report on the Cephalopoda obtained by the F. I. S. "Endeavour" in the Great Australian Bight and other southern Australian localities.** Pp. 203-298; diagrs., ills., bibliogr. *Fisheries: Biological Results of the Fishing Experiments carried on by the F. I. S. "Endeavour," 1909-14,* Vol. 4, Part V, Commonwealth of Australia, Dept. of Trade and Customs, Sydney, 1918. [Explorations were carried on chiefly in the Great Australian Bight and in the immediate neighborhood of Bass Strait. The geographical distribution of the various species, their zoögeographic relationships, and the bathymetric distribution are briefly noted.]

Cotton, C. A. **River terraces in New Zealand.** Diagrs., ills. *New Zealand Journ. of Sci. and Technol.,* Vol. 1, 1918, No. 3, pp. 145-152. Wellington.

Cotton, C. A. **The geomorphology of the coastal district of southwestern Wellington.** Map, diagrs., ills. *Trans. and Proc. New Zealand Inst.,* Vol. 50, 1918, pp. 212-222. Wellington.

Davis, W. M. **The great barrier reef of Australia.** Map, diagrs. *Amer. Journ. of Sci.,* No. 263, Vol. 44, 1917, pp. 339-350. [A physiographic interpretation.]

Day, T. E. **Report and plans of explorations in Central Australia.** 22 pp.; map, ills. *Bull. of the Northern Territory No. 20.* Melbourne, 1916.

Dodwell, G. F. **Results of magnetic and astronomical observations.** Maps, ills. *Geol. Survey of South Australia Bull. No. 5,* pp. 57-72. Adelaide.

Honman, C. S. **The geology of the country to the south of Kalgoorlie (Coolgardie and East Coolgardie goldfields), including the mining centers of Golden Ridge and Feysville.** 75 pp.; maps, diagrs., ills., index. *Western Australia Geol. Survey Bull. No. 66.* Perth, 1916. [Of geographical interest only for the section entitled "Topography," 10-12, in which there is a description of the three chief physiographic features of the country south of Kalgoorlie, (1) the higher land, (2) the sand plains, (3) the dry lake country. It is asserted that the forces of wind erosion are stronger than the erosive action of water and that enormous accumulations of detrital material are being made upon the land. The water has but moderate control over the great sheets of land waste and therefore collects in strings of salt lakes in the depressed areas. The sand plains cover many miles of country and appear to be intermediate piedmont surfaces between the higher land and the lake country on either hand.]

Jack, R. L. **The geology and prospects of the region to the south of the Musgrave Ranges, and geology of the western portion of the Great Australian Artesian Basin.** 54 pp.; maps, diagrs., ills., bibliogr. *Geol. Survey of South Australia Bull. No. 5.* Adelaide.

Jutson, J. T. **On the occurrence and interpretation of rock-cliffs and rock-floors on the western shores of the "dry" lakes in south-central Western Australia.** Maps. *Geol. Mag.*, Decade 6, Vol. 5, 1918, No. 7, pp. 305-313. London. [These "dry lakes" are characterized by rock cliffs and rock floors on their western sides; sand dunes, sand plains, and silt on the east. "These features, which repeatedly occur over a wide area, indicate, in the writer's opinion, that the lakes are migrating westward; and that wind erosion is playing the dominant part in such migration and consequently in the present forms and position of the lakes."]

Kissel, F. T. M. **The distribution of population in New Zealand.** Maps. *New Zealand Journ. of Sci. and Technol.*, Vol. 1, 1918, No. 4, pp. 210-211. Wellington. [The author has worked out the density of population in each county, taking as basis the statistics published in the New Zealand Year Book, 1917. These results he has represented upon maps of North and South Islands.]

Taylor, Griffith. **Meteorological flights in Australia.** Maps, diagr. *Australian Monthly Weather Rept. & Meteorol. Abstr.*, Vol. 4, 1913, No. 7, pp. 369-371. Melbourne, 1917.

OCEANS

Babcock, W. H. **Certain pre-Columbian notices of the inhabitants of the Atlantic islands.** *Amer. Anthropologist*, Vol. 20 (N. S.), 1918, No. 1, pp. 62-78.

The treatment of the subject is confined territorially to the eastern oceanic islands, from Iceland to the Canaries. After citing information as to the settlement of Iceland by Norsemen about the opening of the tenth century and of preceding visits by a few Irish monks, the author mentions occasional early visits to the Azores, Phenician coins having been found on the coast of Corvo, and draws attention to the need of archeological and anthropological research on that island. The declaration by Plato respecting Atlantis, in the fifth century B. C. on the faith of much earlier writings, Mr. Babcock suggests might refer to Madeira or to some land not far removed, though conceived of as on a much larger scale than anything now existing there. The tale of Atlantis is presented, with its climate, physical characteristics, and geographical situation, all of which tend to point to Madeira, "but the human life reported has no note of authenticity," rather seeming to echo observations along the Mediterranean coasts of Europe. Early references to the Fortunate Islands, or Canaries, by the elder Pliny and to the Ogygia of Plutarch are given, and the world map of the Arabian geographer Edrisi, of about 1155, together with his geographical account of the known world, is discussed more or less in extenso for the light it sheds on the knowledge of the islands identifiable as the Canaries and the Azores, with their strange if not entirely mythical inhabitants, as well as many other Atlantic islands not so easily identified—Al Mustackhin, Calhan, Isle of Sheep, and Laca. Early romances of sea-roving Irish to islands far beyond their native heath are mentioned, "but after much traveling among monsters and adventures we find surprisingly little to indicate observation of the real inhabitants of any real islands remote from Hibernia." Italian accounts of journeys to the "Rediscovered Islands," identified as the Canaries, in the fourteenth century, are quoted from Major's translation, and subsequent early voyages to the Canaries are alluded to—of Lopez, Bethencourt, and Cadamosto. In conclusion Mr. Babcock asserts that "we have no evidence of human occupancy in Iceland other than Celtic and Norwegian; . . . that the case for the Azores and Madeira is much the same," although an early native population is suggested; "but that there is ample and detailed information concerning a native population of the Canaries who must have reached their island homes by navigation in remote times and who occupied stations well advanced toward America on the route first followed by Columbus." F. W. Hodge

Babcock, W. H. **The so-called mythical islands of the Atlantic in mediaeval maps.** Maps, bibliogr. *Scottish Geogr. Mag.*, Vol. 31, 1915, No. 5, pp. 261-269; No. 6, pp. 315-320; No. 7, pp. 360-371; No. 8, pp. 411-422; No. 10, pp. 531-541; Vol. 32, 1916, No. 2, pp. 73-79; No. 3, pp. 131-140; No. 9, pp. 418-428; No. 10, pp. 477-484.

Gallé, P. H. **Cyclonen in de Arabische Zee.** 20 pp.; diagrs. *Kon. Nederl. Meteorol. Inst.* [*Publ.*] *No. 102: Mededeelingen en verhandelingen 21.* Utrecht, 1916.

Gravier, Ch. **L'expédition océanographique du "Michael Sars" dans l'At-antique septentrional.** Diagrs. *Rev. Gén. des Sci.*, Vol. 23, 1912, Jan. 30, pp. 60-67.

Linssen, Rudolf. **Beiträge zur Kenntnis der physischen Verhältnisse im Gebiete der Neufundlandbank.** (Inaugural-Dissertation zur Erlangung der Doktorwürde der Philosophischen Fakultät der Albertus-Universität zu Königsberg i. Pr.) 6 pp.; diagrs., bibliogr. Robert Noske, Borna-Leipzig, 1914.

Loft, Genivera. **The Gulf Stream and the North Atlantic Drift.** *Journ. of Geogr.*, Vol. 17, 1918, No. 1, pp. 8-17.

WORLD AS A WHOLE AND LARGER PARTS

Calderón, F. G. **El panamericanismo: Su pasado y su porvenir.** *Rev. Hispanique*, No. 91, Vol. 37, 1916, pp. 1-60. New York.

Pan-Americanism—what does it look like from the other side of the equator? We often wonder how it appears to the "other Americans." In this article we see the matter presented from the viewpoint of a Latin-American diplomat. Señor Francisco García Calderón should be well acquainted with the political attitude of the Latin races of America, and, with studied fair-mindedness, he gives us their point of view.

Pan-Americanism is, he says, different from other such combinations, Pan-Germanism, Pan-Slavism, etc., in that it is based neither upon race, language, creed, nor customs. It is geographical and moral, and entirely voluntary. Señor Calderón considers the Atlantic is still a geographical barrier and thinks that alliances, even of kindred races, could scarcely span its waters. Hence the logic of Pan-Americanism.

The idea of Pan-American union was South American in origin. The United States had recognized the Spanish-American republics. The Monroe Doctrine had been promulgated. But this country was interested chiefly in keeping off dangerous European rivals. Her ambition was largely selfish. Henry Clay expressed ardent sympathy with the idea of political co-operation, but the administration and Congress held aloof from alliances of all kinds. The United States reluctantly accepted the invitation to attend the conference called by Bolívar to meet (1826) at Panama, the geographical center of the Americas, but she would make no pledge of aid in case of European aggression.

Little came of the conference. Spanish-American countries continued to call such congresses—usually attended by few of the republics—at intervals until 1864. These assemblies, however, failed to unite even the peoples of Spanish speech. Pan-Americanism could not rally them to the defense of the Pacific Coast countries, when in 1865 Spain renewed her attempts against them. It also failed to curb Chile's individualistic tendency in 1879, when she wrested from Peru and Bolivia a part of their territory. The efforts at American federation dwindled gradually until they were evidenced only by occasional scientific congresses.

But when Spanish America had failed to bind the nations of the New World together for their mutual welfare, then "Saxon America" undertook the task. She had previously held back partly because the more remote portions of South America were too distant greatly to affect her interests, partly because the Spanish-American statesmen were too ardent advocates of human liberty to suit the slave-holding states of the South. In the War of the Pacific the United States made offers of mediation, but Chile rejected all intervention. In the years that followed, led first by Blaine, later by Root, the United States continued her efforts. She gave matters a practical turn; her consuls studied the economic conditions of Latin America; diplomatic visits were exchanged; cordial advances were made.

It was now Latin America that held back. She saw Texas, California, New Mexico and Arizona, Porto Rico, and Panama added to the northern republic and thought she had grounds for distrusting the motives of the United States. Furthermore, she disliked paternal tutelage. She preferred to settle her own affairs even though it cost her constant internal strife. She felt, too, that the North could give her neither the capital nor the immigrants she needed to develop her resources.

But she finally saw that her frequent domestic conflicts gave some justification for the intervention of the *rubio conquistador* and that it was better he should come as a friend. Watching European politics she saw, too, that she really had only two choices, Pan-Americanism or Germanism. The republicanism of the New World was more congenial than the imperialism of Germany. The idea of American solidarity was accepted, though for a time it consisted chiefly in orders given by the temperate zone and obeyed by the tropics.

A new aspect was given to the matter when the nations of the south temperate zone as they grew in power, demanded a voice in the councils of the American continent Encouraged by the deference shown them at the conferences of the Hague, the A B C of Latin America ventured to intervene in the Mexican question. ''Examining and correcting the bases laid down by President Wilson,'' they effected an arrangement better adapted to the needs of distressed Mexico.

This entry of the A B C into a position of equality with the United States created a really powerful moral force in America and in the world. The idea of Monroe, far from becoming obsolete, became rather a ruling principle for all America. Señor Calderón thinks it is well that this powerful federation has come into existence, for, as Mr. H. G. Wells has prophesied, after the war there will be across the Atlantic two great groups of influential nations, England and her allies on the one hand, and the Germanic combination on the other. Pan-Americanism must be the third great force which will share with these powers the control of the world.

This Pan-Americanism, strong in the geographical proximity of its units and constantly growing stronger as the nations of the New World complete their program of political, economic, intellectual, and moral co-operation, is the only force able to act as guardian of the Western Hemisphere. It is the only power that can preserve the New World ideas of democracy, arbitration, and peace.

Brooks, C. E. P. **Continentality and temperature.** Maps. *Quart. Journ. Royal Meteorol. Soc.*, No. 182, Vol. 43, 1917, pp. 159-173 (discussion, pp. 172-173). [''Eurasia between latitudes 40° and 60° N., and extending from the Atlantic coast and islands eastward to longitude 90° E. In the west the area was extended northwards to include the whole Baltic basin.'']

—— **Carnegie Institution of Washington, Year Book No. 15, 1916.** viii and 404 pp.; maps, index. Washington, D. C., 1917. [The annual reports of the Carnegie Institution of Washington are of growing interest to geographers on account of the pioneer work of the various departments which leads a number of them frequently to take the geographic trail. This is particularly true of the departments of history, botany, geophysics, and terrestrial magnetism. Especially noteworthy at this time are the bibliographical work on American historical material in the Russian Archives by Professor F. A. Golder, the climatic studies in the Southwest, the research work on volcanoes, and the various magnetic explorations of the non-magnetic *Carnegie*, which circumnavigated the globe in 1916 in latitude 60° S. and discovered errors of 12° to 16° in the variations of the compass on mariners' charts for the region off the southwest coast of Australia.]

Chandler, C. L. **Inter-American acquaintances.** 2nd edit. extended. vi and 187 pp. The University Press of Sewanee, Tenn., 1917. $1.25. 8 x 5. [The one thing in this volume that is of interest to geographers is the unrelated last chapter—a brief sketch of the important rôle played by the Basques in the exploration, conquest, and settlement of Spanish America.]

Grice, J. W. **The resources of the Empire.** 64 pp. (International Information Series, British Empire Section, Vol. 1). George Allen & Unwin, Ltd., London, 1917. 8 x 5½. [The first of a series whose aim is ''the explanation of the British Empire, its composition, institutions, and resources, in the light of their value and possibilities for Allied and neutral countries.'']

Halsey, F. M. **Investments in Latin America and the British West Indies.** 544 pp.; map, ills. *Bur. of Foreign and Domestic Commerce Special Agents Ser. No. 169.* Dept. of Commerce, Washington, D. C., 1918. [A highly important monograph dealing in detail with the resources and development of the republics and colonies south of the United States. The data have been drawn from official sources, and the statistics of production and trade are usually the latest available. This manual will be of particular interest to those contemplating investments in the fields referred to, but it also forms one of the most detailed, most accurate, and most up-to-date general descriptions of the economic conditions existing in those countries.]

THE
GEOGRAPHICAL REVIEW

Vol. VII MARCH, 1919 No. 3

THE REGIONS OF MIXED POPULATIONS IN NORTHERN ITALY*

By OLINTO MARINELLI
Professor of Geography, Royal Institute of Higher Studies, Florence

[With separate map, Pl. III, facing p. 144.]

Medieval Colonization of the Alps and the Present Ethnography of Northern Italy

ETHNIC UNIFORMITY OF THE PO VALLEY

It is strange that the Po Valley should be linguistically so uniform, in view of the repeated barbarian invasions to which it has been subjected. From its western extremity at the base of the Alps in Piedmont to its easternmost limit, where it joins the slopes of the Carso near Monfalcone, it is inhabited by a population which, except for slight anthropological differences and dialectal variations, shows how the language and civilization of Rome unified races of divers origins. After the Gallo-Italian dialects, such as those of Piedmont, Lombardy, and Emilia, come those of Venetia and Friuli; yet they are all dialects of Italian and are dominated by Italian as a language of culture. The only traces remaining of medieval foreign occupation are to be found in the place names; and even these are scattered and insignificant, with the exception of a well-localized group of Slavic names in the plain of Friuli west of Udine. Except for this latter region, which furnished the highroad for the foreign invasions, the great Po Valley, even in the centuries of Italy's greatest depopulation, possessed enough civilized inhabitants to assimilate the people who came from outside, often in great masses but always without sufficient support from new arrivals. The valley might be held for centuries by foreign peoples, but they were always sure to be more or less rapidly fused with the native population.

---

*Translated by President W. W. Comfort of Haverford College, Haverford, Pa., from the Italian original written for the *Geographical Review*.

Copyright, 1919, by the American Geographical Society of New York

THE ALPINE PEOPLES

Very different, however, were the vicissitudes of the Alpine distric which flanks the Po Valley. Here natural conditions prevent a dense population and an uninterrupted settlement. The thickly populated district are confined to the valley bottoms and to the slopes with favorable exposure

The Alpine peoples, of whatever origin, may have been able partly t escape from Celtic influence but not from that of Rome. In antiquity they like the peoples of the plain, were almost completely Latinized. There i evidence of this in the series of Alpine dialects which with slight interruption extends from the Grisons to Friuli—dialects differing among themselves but regarded by linguistic experts as constituting a single grou called “Ladin.” Some of these peoples call themselves “Ladins,” whil others call themselves “Romansh”; both terms are reminiscent of th civilization of Rome and at the same time are living indications of its confines. Today, however, these confines are no longer what they once were The place names show that the Ladin territory included a great part o eastern Switzerland and of the Tyrol, Vorarlberg, a great part of Bavaria Salzburg, the Pustertal, and other territory which is now German. It use to include also the Julian Alps, now in great part Slav.

It appears certain that the population of the Alps, already sparse i ancient times, became still more sparse during the early Middle Ages whereas the Germanic and Slavic peoples experienced that great increase which was the indirect cause of the violent migrations toward the Mediterranean countries and of those slower and more continuous movement of expansion by which their present distribution in Europe is chiefl explained.

MEDIEVAL COLONIZATION OF THE ALPS

Almost all the great barbarian invasions were directed at the regions o Italy which were richest in treasures accumulated through the ages. The Alps could only prove a temporary resting place for peoples who were seeking passage by the easiest and most accessible routes. So these invasions had no direct influence upon the ethnography of the Alpine territory but only an indirect influence due to the havoc they wrought along their path. Of far greater importance were the varied colonizing movements which took place in the wake of the great barbarian invasions for centuries. This colonization was accomplished by groups that were numerically small but were often renewed during the long periods of time involved; they found the conditions favorable for a secure settlement in the midst of the sparse Alpine population. These movements lasted until the thirteenth and fourteenth centuries, and in some cases even longer. They were often favored by feudal lords who desired to populate abandoned territories and who were unscrupulous about the people among whom they recruited colonists.

GERMAN COLONIZATION

It is well known that in the Middle Ages the Alps were less a country of feudal castles than of hospices and convents. Even before any conception of nationality was developed, the abbots and bishops were the natural upholders of the Roman element, while the dukes, counts, and marquises—almost all of German origin—were certain to favor the German element. Nevertheless, in many of the ecclesiastical estates German colonization proceeded without hindrance and in some cases with encouragement. This is explained in part by the fact that the Italian element had no settlers to furnish, and in part by the fact that the Germans alone possessed the knowledge of some special craft, such as that of mining. At the eastern end of the Alps the Franks granted lands in the plain of the Tagliamento to the Slavs, while later the Patriarchs of Aquileia admitted to their territory groups of German settlers. All this shows that we are dealing here with phenomena explained by geographic, economic, and social factors which were more weighty than the desires of the governors.

In several particulars the German colonization of the Alps differed from that of the Slavs, among others in the greater rôle played by agriculture and various arts and trades as compared with stock-raising, and because in general it was later and continued longer; there were, too, some territories in which the Germans came and settled in Slav colonies.

SLAV COLONIZATION

The movement of the Slavs toward the west began at the end of the sixth century and was arrested by the Bavarians in the Pustertal and by the Lombards in Friuli. But these combats were probably against the first bands of robbers, behind which came the peaceful stream of colonists, not numerous, but sufficient to populate completely Styria, Carinthia, Carniola, and parts of Friuli and Istria. The Italian element with which they came into contact in the latter regions showed a remarkable power to assimilate the Slavs. But only in a few cases could it offer an effective resistance. A considerable resistance was offered, however, by the German element, especially in Carinthia. In the eighth century the German colonists had begun to establish themselves in force among the Slavs, who were evidently much scattered, so that Carinthia and northern Styria were already in the twelfth century largely populated by Germans or Germanized Slavs, as were also later central Styria and the greater part of the basin of Klagenfurt. This diffusion of the Germans over territory once Romanized and later become Slav took place on the southern side of the Alpine watershed only in a few cases, as in the upper valley of the Fella (at the source of this river and at Pontafel) and in the basin of the Isonzo, where, however, the little colony of Deutschrut, imported by the Patriarchs of Aquileia in the fourteenth century, has now become Slovene.

NON-COINCIDENCE OF ALPINE WATERSHED WITH ETHNIC BOUNDARY

There have been many cases on the other hand in which German colonization passed beyond the Alpine watershed, pouring directly into Italian territory. The most notable is certainly that of the upper Adige region; but from the Monte Rosa massif to the Carnic Alps there is a whole series of German peninsulas and islands in Italian territory. On the other hand, around the upper Rhine and the upper Inn (Engadine) the Ladin element is still found on the northern slope of the Alps. Thus, when the line of the Alpine watershed is considered in relation to the limit between the German and Italian peoples, it is easy to see that a coincidence is quite exceptional. It is evident also that the medieval colonization of the Germans followed sometimes the highroads from the trans-Alpine countries into Italy and sometimes secondary paths and difficult passes; wherefore it is not always easy to see a close relationship between the topography of the Alps and its ethnographic conditions.

The Territories of Mixed Populations

LOCATION BETWEEN POLITICAL BOUNDARY OF ITALY AND ALPINE WATERSHED

We must now examine separately each of the territories with a mixed population. They are almost all outside of the political state of Italy, the greater part of them lying between the boundaries of the kingdom and the Alpine watershed. Since this watershed is conventionally regarded as the natural boundary of Italy, these territories are generally considered as outskirts of Italy under foreign rule. To some of them Italian geographers have given special names which differ from their official or political names and sometimes even from their traditional names. ''Venezia Giulia'' (Julian Venetia), for example, has been used by Italians for some decades to designate the region which the Austrian government calls the Küstenland, together with parts of Carinthia, Carniola, and Croatia. The southern part of the Tyrol south of the watershed, on the other hand, is called the ''Trentino'' (i. e. the Trent district), a comparatively old name, and the northern part ''Alto Adige'' (i. e. the basin of the Adige above Salorno), a name only recently used, at least in its present acceptation. The terms ''Italian Switzerland'' or ''Swiss Lombardy'' and the name ''Nizzardo'' (i. e. the district about Nice) have no need of special explanation. Almost none of the regions here mentioned has any geographic unity, since their extent is dependent on the often irrational position of the political boundary of Italy in relation to its so-called natural boundary. Most of these districts result from an aggregate of diversified territories or parts of territories which often have had no common history and have now no administrative unity.

EXTENSION OF TRANS-ALPINE STATES TO ITALIAN TERRITORY FACILITATED BY EASE OF CROSSING ALPINE WATERSHED AND CARSO

Almost all are territories conquered at the expense of Italy, when for centuries it was divided and weak. These conquests usually find their geographical reason in the interest which the Alpine or partially Alpine states had in securing for themselves the possession of the roads which led down into the Po Valley by occupying the passes and southern Alpine valleys. The states in the Po Valley—strong because they were rich in population and civilization—were the states which, although usually at war among themselves, saved Italy from total subjection to the foreigner and later rendered possible its unity. The extension of the trans-Alpine states to Italian territory was facilitated by the fact that the Alps are not everywhere a difficult obstacle and that their divide is not everywhere clearly defined. The line is most undecided at the eastern extremity of the Alpine chain, in the Carso, where most of the watercourses flow partly underground and where none of the various relief features have a decided character. The Carso, indeed, presented serious difficulties to railroad construction, though not requiring long tunnels, but it always offered easy access to the old forms of transportation and to great masses of migratory peoples. The population which established itself in the Carso did not feel that isolating influence exercised in the Alps by the high mountain barriers separating one valley from another. Moreover, even in the more rugged parts of the Carso the anthropogeographical conditions in some respects approach the conditions in the plains, while in other respects they are distinctive.

It is precisely in the region of the Carso that the occupation of Italian territory by foreign peoples has reached its widest extension. Here, in Julian Venetia, we find the greatest aggregation of diversified territories and the greatest ethnic complications.

Istria

JULIAN VENETIA IN GENERAL

Julian Venetia includes, besides a part of Carniola and a smaller part of Croatia, the upper Fella valley, the Gorizia district (i. e. the County of Gorizia and Gradisca), Trieste, Istria, and Fiume. The upper Fella valley was never under the rule of an Italian state; the County of Gorizia, after the extinction of its ruling house, which was feudally dependent first on the Patriarchs of Aquileia and then on Venice, passed in 1500 by inheritance to the House of Austria and has belonged to it ever since; inland Istria, for similar reasons, had previously undergone the same fate, while the seacoast belonged to the Republic of Venice until the Treaty of Campoformio (1797); Trieste in 1382 placed itself beneath the protection of the Dukes of Austria in order to have their support against Venice;

Fiume in 1483 through inheritance came under the same dominion, but in 1778 was handed over to the Hungarian Crown. Julian Venetia includes Alpine territory (the Julian Alps), foothills (Julian Pre-Alps), plateaus (the high Carso) and high plains, and a piece also of real plain (eastern Friuli). It cannot be considered in its entirety, but only in the separate parts into which it is traditionally divided.

ITALIAN CHARACTER OF ISTRIA

Istria is the most notable part of Julian Venetia. Administratively it includes the islands of the Quarnero (Veglia, Cherso, and Lussin) and excludes Trieste and Fiume. The islands of the Quarnero can be considered as belonging physically to the archipelago of Dalmatia, while Istria finds its physical unity mainly in its peninsular character. Istria resembles a typically Italian region both in its physical features and in the human occupation of its soil, especially its arboriculture. An even stronger impression of being in Italy is made upon the visitor by its cities, both by their monuments and the general appearance of their buildings. Art and culture are everywhere entirely Italian.

ETHNIC HISTORY

However, the ethnographic conditions of Istria are complicated. In few regions could there be found a more mixed population. The whole peninsula was Romanized in antiquity, with the result that there became established, in the north, upon a Carnic foundation, a Ladin dialect, which has only recently disappeared, and, in the south, upon an Illyrian foundation, a Venetian dialect, the Istrian of today. In the seventh century there arrived from the north the Slovenes and, a little later, from the east, the Croats. They were chiefly shepherds and only later became tillers of the soil. The Italian population of the cities, located mainly on the coast, maintained itself almost everywhere and in a great part of the region was strengthened by the rule and civilizing influence of Venice. But for various economic and social reasons Istria, in the fourteenth and following centuries, underwent a depopulation. To repair this the Republic of Venice favored colonization by outside peoples, principally from Dalmatia and Albania. The ethnography of Istria is, in large measure, the product of this immigration, which took place in the fifteenth, sixteenth, and seventeenth centuries, and which was directed both toward the inland districts and to those parts of the seacoast remaining unpopulated. The last of these colonies (1657) is that of Peroi, near Pola, settled by people from the Bocche di Cattaro region and by Montenegrins, who still preserve their Greco-Oriental religion. This colonization, which continued more than two centuries, strengthened the Slav element in the interior and introduced it in the Italian cities of the west coast. It also brought Rumanians, the greater part of whom, however, are now Slavicized, their original language eing preserved by only a few hundred people in two small districts in roatian territory. The Slavicized Rumanians are the so-called Cicci Chichis), who inhabit the most mountainous part of Istria, the Fucki, nd perhaps some other stray element, which, in the past, fused with the talian. It is worthy of remark, however, not only that many of the Slavs f Istria use Italian as their language of culture and commerce, but also hat some hybrid dialects have been formed, as is the case with the so-called Schiavetto.

PRESENT ETHNIC CONDITIONS

The last century brought, on the one hand, the strengthening of the Italian element in the coast cities, thanks to the assimilation of the uneducated Slavs and to the immigration of laborers from Friuli, and, on the other, the extension and consolidation of the Slavic element in the country and in the interior. The latter phenomenon may be due to the greater fecundity of the Slavs, their absorption of the Rumanian elements, or their increased spirit of nationality, as a result of which some bilingual populations which in the past considered themselves as Italians today regard themselves as Croats. Later, in the interior of the peninsula, which did not belong to Venice, there was added the German element, which during the feudal period had difficulty in securing a foothold. In very recent times it has become somewhat numerous in a few seaside and winter resorts such as Brioni and Abbazia and at Pola. From being a small town, which a century ago numbered less than 1,000 inhabitants, Pola has become the largest city of Istria, with 60,000 inhabitants, since its transformation into the chief naval port of Austria-Hungary. The other coast cities of Istria had little modern industrial and commercial development. This enabled them to preserve their Italian character intact, in their architecture and their language as well as in all the manifestations of family, civil, and artistic life.

It is difficult to determine with certainty the distribution of the population of Istria according to language, even within its administrative limits (4,956 sq. km.). This is due to the difficulty of classifying mixed or bilingual peoples and to the frequent unreliability of the statistics collected in a region occupied by hostile nationalities. In the census of 1910 the Italians numbered 147,388, the Serbo-Croats 167,966, the Slovenes 55,407, the Germans 13,279, the Rumanians 883. But these figures include only Austrian subjects; thus the 147,388 Italians rise to 153,415 if we add the 6,027 citizens of the kingdom of Italy who inhabit Istria. On the other hand, the number of Germans would be reduced to less than a third if we excluded the garrison of Pola. These figures show, in any case, that in Istria no nationality predominates in a marked degree. It is, however, to be noticed, that in agriculture and economic activity the Italians have an importance out of all proportion to their numbers, so much so that a great many of the Slavs speak Italian.

Trieste and Fiume

As Economic Outlets of a Large Hinterland

Trieste and Fiume do not form a part of Istria either geographically o politically. Trieste has administrative autonomy in Austria and Fiume i Hungary. The small territory included in these divisions—95 square kilometers for Trieste and 21 square kilometers for Fiume—is in contrast wit the size of their present economic *hinterland,* but it finds an explanatio in the conditions of the past, which have their basis in the geographical position of the two cities. Trieste is not at the mouth of a valley, while Fiume is at the mouth of a valley of rather limited length and has behind it the Carso, which is here more impassable than at Trieste. The two cities were for centuries Adriatic ports, much like those of Istria in importance and presenting similar conditions of development. These two cities, as long as they mainly lived from the sea and in the days of small industries, sailing ships, and the old methods of land transportation, developed their economic activity within very narrow lines, which often did not pass beyond the bounds of their own hydrographic basin. So they had a limited importance. Nevertheless their Italianism, although scarcely felt in a nationalistic sense, was in no danger of extinction, because life on the shores of the Adriatic, which is so completely an Italian sea, could not but be strengthened by it. But in modern times these two ports became the outlets of large territories in the interior of Europe, extending far beyond the Danube. The two cities grew rapidly through the influx of inhabitants from near at hand, prevailingly Slavs, and from the more remote regions, Germans in the case of Trieste, and Hungarians of Fiume. To the natural development of this phenomenon we must add in the last decades the policy of the governments of Austria and Hungary, which was directed not only to developing these outlet ports but also to rendering less dangerous the singular state of affairs involved in the fact that the chief port of a state in which the German element dominates is in reality Italian and accessible only across more than a hundred kilometers of Slovene territory and that the chief port of the other state, in which the Magyar element is supreme, is also Italian and accessible only across two hundred kilometers of exclusively Croatian territory. This policy has contributed to diminishing, though in slight measure, the relative numerical importance of the Italian element in the two cities; but it greatly helped to give these Italians a strong sense of their nationality and to make Trieste the chief center of "irredentism"—that is, of the movement for the political reunion of the "unredeemed" districts with the Italian fatherland.

Size of the Population According to Nationalities

Only in the eighteenth century, and especially in the second half of it, did Trieste surpass in population the other cities of Istria—Fiume only n the nineteenth; but, except during the last twenty years, the growth of he two cities, despite the great prevailing influx of Slavs, was always less han the power of assimilation of the more intelligent native element. For nstance, the 120,000 Italians in Trieste according to the census of 1910 oubtless cannot be regarded as descendants of the few thousand who lived here in the first half of the eighteenth century (3,865 in 1735). A large ercentage of the population of Trieste, as is shown by the family names, is of Slav or German origin; another large number is due to the not nconsiderable immigration from Friuli or Venice. This influx, like that of the Slovenes, is explained by the modern industrial development of the city. In 1910, besides the 120,000 subjects of Austria, there were in Trieste almost 30,000 Italian citizens. Out of the 220,000 inhabitants of the city, the Italians represented three-fourths of the population, so that the 60,000 Slovenes, who live chiefly in the suburbs, and to a still greater extent the 12,000 Germans, represented minorities only. At Fiume in 1910 the Italians, including those born in Italy, represented little more than one-half of the population, which numbered about 50,000; yet even numerically they formed the dominant element, as compared with 15,000 Slavs and 6,500 Magyars. It is in the presence of these newcomers that the people of Trieste and Fiume felt their allegiance to Italy all the more, though at first but weakly; but in Istria this allegiance has always been deeply felt, if only in the form of devoted attachment to Venice.

The Gorizia District

The County of Gorizia

The old County of Gorizia represents a fragment of Friuli which a feudal family in the Middle Ages succeeded in detaching from it and which, as we have seen, later passed to the House of Habsburg. Under the name of County of Gorizia and Gradisca it forms a province by itself. It includes, besides a piece of the Carso behind Trieste and the valley of the Vippacco (German, Wippach), which separates the Carso proper from the high Carso (the plateau of Ternova), two principal geographic regions: the valley of the Isonzo and the eastern part of the plain of Friuli. The limits of this province towards the kingdom of Italy are most unnatural; the most unnatural section of the boundary is that which runs through the plain and which is for the greater part defined by the little river Judrio. This was the limit of Venetian Lombardy as long as this region belonged to Austria, and it represented a rectification of a still more complicated boundary which for centuries limited the Republic of Venice on the east. On both sides of this frontier are to be found not only the same physical and economic conditions, but also the same Italian population, which extends compactly to the foot of the Carso. Here there is no question of a mixed population as in Istria, because the separation between the Italian plain and the Slovene mountain district is almost everywhere clean-cu As was shown above, the Slavs had also established themselves in som parts of the plain of Friuli, but here the Italian population quickly r gained the lost territory, and for centuries the ethnographic has coincide with the geographic boundary. Rather than a mixed zone, there coul be distinguished one in which the Slavs, who were in close relations wit the Italian centers at the foot of the mountains, were compelled to speak beside their own dialect, that of Friuli.

The City of Gorizia

Gorizia, which was always the political center of the entire territory has always formed an exception. But ever since the commercial activity of the town in the plain began to prevail over the court life in its feudal stronghold, the city has been almost exclusively Italian in population and character. Recently, however, the development of the city, and especially its suburbs, as a great industrial center has brought about a profound change inasmuch as the workers have been recruited chiefly among the Slovenes. Thus the census of 1910 showed that the population was only half Italian: as against 14,838 Italians (to whom must be added 1,110 subjects of Italy) there were 10,782 Slovenes and 3,236 Germans. These last, when they do not belong to the garrison, are there because Gorizia is a favorite resort of Austrian state pensioners and of persons desiring or requiring a mild climate. (Though with evident exaggeration, Gorizia is often called the Austrian Nice.)

Population of the County

Within the confines of the County of Gorizia and Gradisca (2,918 sq. km.) the census of 1910 showed 90,181 Italians (Friulians and, at Monfalcone, Venetians), to which must be added 8,947 Italians born in Italy, while there were 154,537 Slovenes and 4,481 Germans.

The Slovenes of the Province of Udine and the Resians

It must be noted here that the Slovene area of the County of Gorizia, while it continues on one side into Carniola and into Carinthia, on the other side includes, in the province of Udine, a territory consisting in large part of valleys which send their waters into the Isonzo and which have easy communication with this river. These Slovenes of the province of Udine, according to the census of 1911, numbered 31,730, to which must be added 4,650 Resians, who inhabit the valley of Resia in the basin of the Tagliamento and speak a dialect which seems to be related to Serbo-Croat. These Slovenes of the province of Udine do not anywhere, as they certainly did in the past, reach the plain and still less the Fella valley, along which run the frequented highway and railroad via Pontebba, while in the mountainous region where they have persisted, even if they are distinguished by ir origin and dialect from the people of Friuli, they nevertheless, like m, regard Italy as their fatherland.

The Upper Fella Valley

The upper valley of the Fella, on the other hand, is still subject to Austria far as Pontafel, and throughout its small area of 220 square kilo- ters presents a singular succession of German villages alternating with ovene villages. A little more than half of the entire population, which es not amount to more than 4,000, is Slav; a little less than half is rman. It has been shown elsewhere how in this region German coloni- tion has been superimposed upon that of the Slavs, as is the case through- t Carinthia, of which the upper Fella valley forms a part.

The Upper Adige District and the Trentino

The German-Italian Contact Zone

The valley of the Fella, belonging to the basin of the Tagliamento, is the ly valley south of the watershed where for centuries Italians, Germans, nd Slavs have lived side by side. The Slavs once extended west as far as e sources of the Rienz (south of Toblach) but left their only trace there the place names; so that today to the west of the Fella we find only uperimpositions of the German element directly on the Italian. These uperimpositions took place during a long period of time, but the ethno- raphic situation today is substantially the product of the eleventh to the ourteenth centuries, during which German colonization, favored by the oreign lords, became possible because extended tracts in the Venetian nountains were sparsely populated, while they were rich in unexploited ninerals, forests, and pastures. Small German groups crossed the Carnic lps, entering the upper basins of the Tagliamento and of the Piave (the villages of Timau and Sauris in the former and Sappada in the latter, with total population of less than 3,000, are still German), but the main hannels of German penetration south of the watershed led along the upper forks of the Adige, which continue the lines of easiest communication between Central Europe and Italy. These lie over the Brenner (1,362 meters) and the Toblacher Feld (1,208 meters). The German colonization, though intense, was practically confined within the principal valleys, so that in the higher and more remote valleys the original Ladin population was able to persist for a long time, in some cases even to our own day. Hence beside the Val Monastero (Münstertal), which is connected with the basin of the Adige but is politically a part of Switzerland, the Val Gardena (Grödnertal), an eastern tributary of the Eisack, is also Ladin, as well as the valleys of Marebbe (Enneberg) and Badia (Abtei), both of which send their waters to the Rienz. In the lower part of the valley of the Adige the German infiltration was stopped by the presence of a more numer Italian population, and here, between Bozen and Salorno (Salurn) la zone of contest between the two populations—a contest which still continu But this did not prevent German colonization from thrusting small un much farther south, even to the Pre-Alps, in sight of the Venetian plai but here, contrary to what happened in the upper Adige region, the G mans did not maintain themselves in the main valleys, but settled in t higher tributary valleys and on the table-lands. This is the case with t isolated German colony of the Mócheni in the valley of the Fersina east Trent and with the Germans of Luserna, on the Austrian side of the plate of the Sette Comuni. The whole plateau was once populated by German peoples, but they are today in great part Italianized—the number of Ge mans in the Sette Comuni being only 2,800 in 1911—as are also almost a the inhabitants of the Tredici Comuni north of Verona, where in 191 German was spoken by only 170 persons.

Germanization of the Ladins

While the ethnographic conditions of the Adige basin and the adja cent regions are largely due to the immigration of the period prior to th fifteenth century, yet many changes have taken place since, even down t our own time. On the one hand the Italianization of the more advance German centers has made progress; on the other the Ladin element ha become in most cases Germanized or is now becoming so. The latte phenomenon is due not so much to inferior civilization as to other circum stances.

The region about the headwaters of the Adige, once Ladin, lost its original character, not only through frequent contact with the German element but also because in the seventeenth century the local dialect was forbidden in order to prevent the spread of Calvinism in the Tyrol from the Engadine. On the other hand, with the change in the suitableness of a terrain to communication which modern progress in methods of transportation has brought about—a change which led to the abandonment of the uplands and divides formerly favored for secondary routes and the selection of the valley trenches, even when narrow—the elevated tracts and high tributary valleys populated by the Ladins partly lost contact with each other and established closer relations with the inhabitants of the deep main valleys. In general, they were no longer able to maintain the isolation which for centuries had preserved their characteristics. Another contributory influence to this result was the passing of tourists, who were in great part German. We are now referring to the Ladins in the Dolomites. By means of the schools and an intense propaganda organized by Austrian and German societies for the diffusion of the German language and influence, these Ladin populations are drifting away from their natural cultural affiliation, without making any appreciable resistance.

THE BOZEN REGION

As has been pointed out, the zone for the possession of which the Italians d Germans have most contended and still contend has Bozen for its nter and extends from Meran to Salorno. The valley of the Adige lies a rather low elevation at this point (Meran, 301 meters; Salorno, 224 eters) and especially in the section above Bozen is well protected from rth winds, has a limited rainfall, and enjoys a climate which permits the lture of the vine and of the mulberry, thereby making this the region in ich Mediterranean vegetation and cultivation penetrate farthest into the ps. On the racial distribution this fact has had two opposite effects: it s favored the inflow of Germans to certain centers as health and summer sorts, on the one hand, and, on the other, the immigration of cultivators om the Trentino into the rural districts. This last phenomenon arises om two causes: the Tyrolese have less experience than the people of the entino with intensive agriculture, and the latter, because of the economic nditions in their own district, have been compelled in the last decades to migrate in large numbers, some going to distant America and others to e neighboring regions of the Tyrol and Vorarlberg. The 17,182 Italian nmigrants from Austria listed in the United States census of 1910 under foreign white stock'' were almost all from the Trentino.

Through Bozen and the valley south of it passes the Brenner highway. ence, the development of this center and of the region tributary to the ighway always reflected the fluctuations of commerce and industry, which, the past, have favored the influx now of Italians, now of Germans. Since ne construction of the railroad the latter have had a distinct advantage. he conditions of the Italian element between Meran and Salorno have, erefore, been quite varied; of late, the Italians have tended to increase in ne country and to decrease in the cities and towns. However, when we ass from this disputed territory and enter the high, tributary valleys, the pper Adige district is almost entirely German, whereas the Trentino is lmost exclusively Italian.

POPULATION OF THE ALTO ADIGE AND THE TRENTINO ACCORDING TO NATIONALITIES

The upper Adige district, i. e. the basin of the Adige above Salorno 7,178 sq. km.),[1] if we depend upon the Austrian census of 1910, which ertainly is inexact but for which it is difficult to find any substitute, was nhabited by 215,345 Germans and 16,510 Italians. Even if this last figure ught to be doubled or tripled in an impartial reckoning, and with the ddition of those born in Italy, the Italian element would still form a small ninority.

In the Trentino (6,356 sq. km.), still according to official figures, the

---

[1] This district includes the administrative divisions, called political districts, of Bozen, Brenner, rixen, Meran, and Schlanders.—TRANSLATOR'S NOTE.

Italians, exclusive of those born in Italy, numbered 377,039, the Germa 13,477; but this last number would be reduced to less than half if th members of the garrisons and the government employees were exclude The Trentino, besides the middle section of the Adige basin between Salorn and the Italian frontier includes Giudicaria, i. e. the basin of the uppe Chiese and the Sarca, with a part of Lake Garda; the Valsugana, i. the upper Brenta valley; and the regions around the sources of the Astic (Lavarone), of the Cismone (Primiero), of the Cordevole (Livinallongo and of the Boite (Ampezzo). The two last regions, corresponding to th political district of Ampezzo (390 sq. km., 6,674 population), because o their history and their geographic conditions, are considered to be outsid of the Trentino proper. The population speaks a Ladin dialect strongl affected by Venetian. In the Dolomites it is the district most frequente by foreigners; this explains why in the census of 1910 we find 443 persons who speak German. Though the Trentino does not represent a complete geographic unit, it possesses an individuality of its own, if only by contrast with the upper Adige district, in population and physical and economic conditions. The tree culture of the Italian plain and hills is widespread here, and around Lake Garda even the olive grows. Toward Italy are directed the aspirations and interests of the Trentino.

INDIVIDUALITY AND SEPARATIST TENDENCY OF THE TRENTINO

In earlier centuries this difference between the upper Adige and the Trentino was recognized politically in the independence of the episcopal principality of Trent, which lasted until 1796 and, though with a few variations in the boundary, embraced almost all the racially Italian area. Yet no account was taken of this difference by Austria in the present system of administrative divisions. In this the Trentino forms, together with the Tyrol, a single province (i. e. the County of Tyrol and Vorarlberg) whose government is in the main entrusted to the German majority. For, according to the census of 1910, in the total population of 1,049,169 the Germans numbered 651,858, the Italians 391,557.

The struggle of the latter for their liberation from the Austrian yoke assumed, then, not only the form of irredentism, or return to the Italian fatherland, but also agitation for administrative autonomy, or separation from the German Tyrol. Notwithstanding the legitimacy and legality of this demand, it was never heeded by the Austrian government. The Italianism of the Trentino, in culture, in tradition, and in sentiments, has been splendidly demonstrated not only in the daily opposition to the arrogance of the central and provincial governments and to the invasion of the German element, abetted by the Pan-German societies, but also in the support of schools and other cultural agencies through which even the lowest classes of the people tried to strengthen their Italian allegiance, even to the point of purging their dialect of the slight traces of German which had crept into it during the centuries of commercial relations. Thus their aspiration grew continuously to free themselves from the double yoke of their forced membership in a foreign state and their administrative association with real enemies.

It is not out of place to recall here how the struggles undertaken within the sphere of Austrian law by Italian subjects of Austria, for the autonomy of the Trentino, for an Italian university in Trieste, and for many other ideal and material interests, had little effect, inasmuch as they were strenuously opposed by an always hostile government. This is because, while in the Adige region the Italians were in open opposition to the Germans, in Julian Venetia they were confronted chiefly with the Slavs; so that they did not have the support even of the latter, who ought to be, as they now are, their natural friends.

Italian Switzerland

The Two Teutonic-Romance Contact Zones

When we turn from the territories subject to the Austrian yoke to consider Switzerland, the problems of the contact between the Romance and Teutonic peoples present themselves under quite different aspects. Two contact zones should be distinguished, a longitudinal, running east and west, along which Rhaeto-Romans and Italians abut against Germans, and a transverse, running north and south, along which French peoples face the Germans. In the latter zone the German element comes into contact chiefly with populations whose dialect belongs to the Franco-Provençal group and whose written language and culture are almost completely French. The ethnic boundary was more subject to successive thrusts toward the west, the chief of which occurred before the year 1000. The French element strongly resisted this movement at various times, but it has resisted it especially in the last decades.

The German Wedge

The ethnic boundary between Germans and French lies not only in Swiss territory, but continues into Italian territory. Here, south of the Monte Rosa group the Germans in the valley of Gressoney (German, Lystal) are on the west in contact with Franco-Provençals of the valley of Aosta, among whom French holds first place in the church, schools, and in general culture. We also find Germans southeast and east of Monte Rosa in the upper Val Sesia and its tributaries (Alagna, Rima, and Rimella) and in the valley of Anzasca (Macugnaga). Gondo (G., Ruden) and Simplon (Simpeln) are also German; although on the southern side of the Alpine watershed, they belong politically to Switzerland. In Italian territory the valley of Formazza (G., Pommat), i. e. the uppermost valley of the Toce, and, in the Swiss canton of Ticino on the other side of the crest which encloses the valley on the east, Agaro and Bosco (G., Gurin) are likewise

German. It is probable that these German centers, which today number, all told, about 5,000 inhabitants, were in the past more numerous, but the more advanced of them, like Ornavasso on the lower Toce near Lake Maggiore, have not been able to avoid the assimilating influence of the more numerous and cultured Italian population, and this influence still continues in force.

Taken together as a unit, the Germans of these wild Alpine valleys form a wedge whose apex, at Issime,[2] is thrust forward to within 20 kilometers of the Po Valley. This wedge completely separates French Switzerland from Rhaeto-Romanic Switzerland, which includes almost all the valleys of the uppermost Rhine and Inn basins and the Val Monastero, already mentioned, all, except the last, lying north of the Alpine watershed. The watershed separates this valley from the rest of Rhaeto-Romanic Switzerland and puts it in more direct and intimate relation with German Tyrol.

The Rhaeto-Romans and Their Increasing Germanization

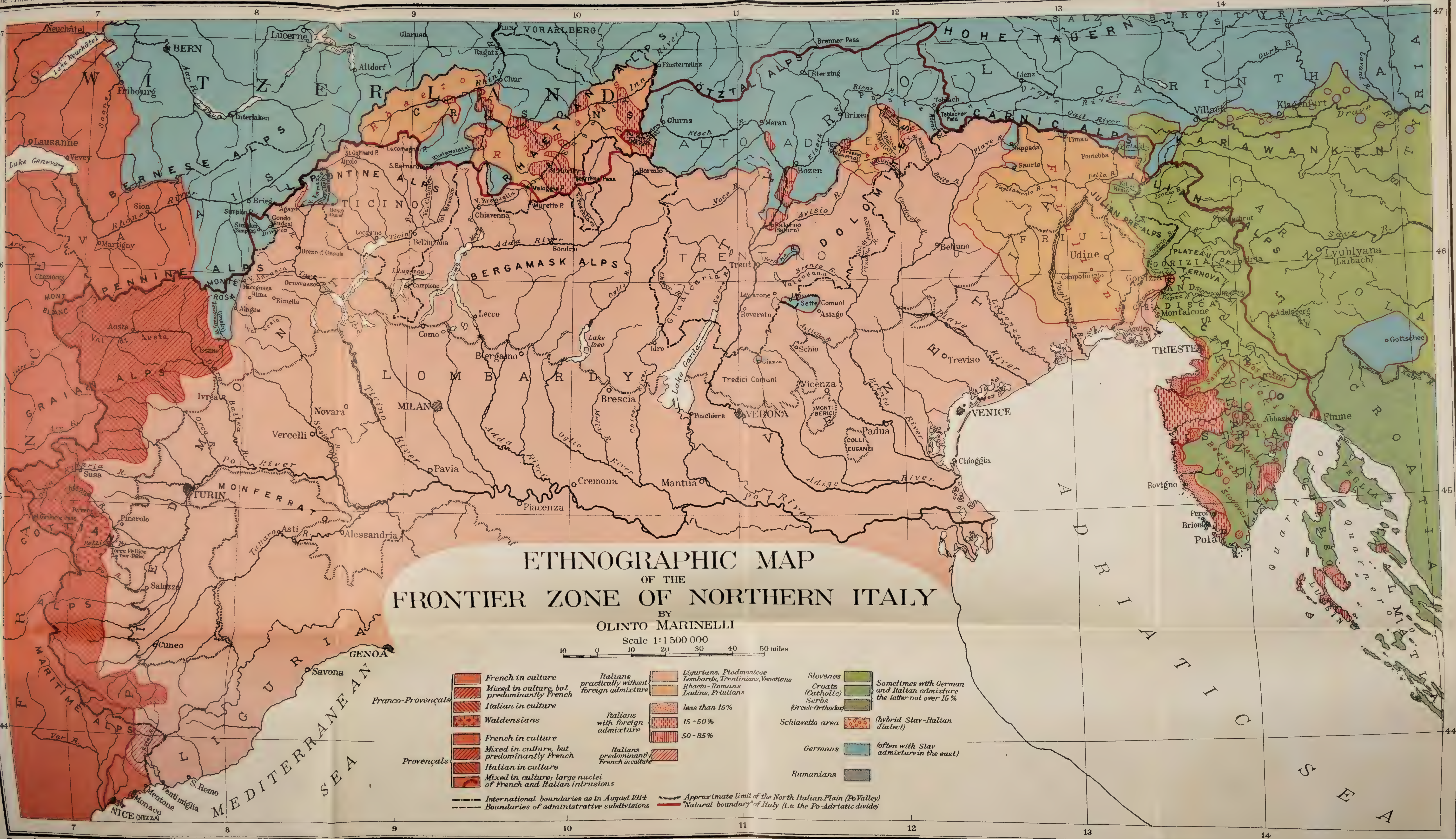
The condition of things as here set forth explains why the Rhaeto-Romanic people of the canton of the Grisons do not consider themselves Italians, as do the Ladins almost everywhere else in the Alps. The Rhaeto-Romanic people have tried to raise their dialects to the dignity of literary tongues, though with little result. This effort has hardly passed beyond the most elementary stage, for their culture is German and is growing increasingly so not only through the influence of the schools but also through commercial relations and the flourishing foreign tourist trade.

The Rhaeto-Romanic people of the Grisons could not look toward France, from which they are separated by too wide a German zone, nor towards Italy, from which they are cut off not only by the main divide of the Alps but also by differences of religion (they are largely Protestant) and feeling. In their inability to create for themselves a real language and a culture of their own and in their reluctance to adopt that of one of the great Latin nations, many students of the question see their weakness and fear their early disappearance.

Indeed the colonization by Germans of some of the valleys of the upper Rhine in the Middle Ages already at this time interrupted the continuity of the Rhaeto-Romanic territory. Furthermore, in many centers of mixed population, especially those on the floor of the main valleys, the German element has been increasing of late as a result of the growth of commerce and the influx of German travelers. The very favorable climate, both in summer and winter, of the Engadine, for instance, has made it and its center, St. Moritz, one of the most famous health and winter-sport resorts in the world. St. Moritz is frequented especially by Germans. The growth of

---

[2] In this commune the subdivision of Issime St. Jacob is German in speech while that of Issime St Michael is French. In the schools Italian and French are taught, as in the other communes of the District of Aosta.



ETHNOGRAPHIC MAP
OF THE
FRONTIER ZONE OF NORTHERN ITALY
BY
OLINTO MARINELLI

Scale 1:1 500 000

Copyright, 1919, by the American Geographical Society of New York

Drawn by Wm Briesemeister

J. BIEN LITH. N.Y.

the tourist trade has not caused any falling off in the old tendency of the natives of the Engadine to emigrate, usually for part of the year, to various parts of Europe.

The Number of Rhaeto-Romans

The number of Rhaeto-Romans in Switzerland has remained stationary for some decades at about 40,000, which represents a constantly diminishing proportion to the total population of Switzerland as well as to that of the Grisons, outside of which canton there are only a few thousand in other parts of Switzerland and some in Italy and the United States. (The census of 1910 showed 408 Rhaeto-Romans in the United States.)

The Italian Parts of the Canton of the Grisons

The canton of the Grisons also includes, south of the main Alpine watershed, territories with Italian populations (in all less than 10,000 people). These are the Val Mesocco and the Val Calanca, whose waters flow first into the Ticino and then into Lake Maggiore, and the Val Bregaglia and Val di Poschiavo, whose waters reach Lake Como through the Mera and the Adda. These form a part of so-called Italian Switzerland, which includes, in addition to these three little pieces of the canton of the Grisons and a small piece of the canton of Valais (the upper valley of the Diveria near the Simplon Pass), the whole of the canton of Ticino.

The Canton of Ticino

Italian Switzerland is lacking in geographic unity as well as in political unity. The territory itself of the canton of Ticino (2,801 sq. km.) is an aggregation of very different parts, with limits which cannot but appear very strange, especially where they include half of Lake Lugano, leaving on one of its shores, as an exclave in Swiss territory, a small area belonging to Italy (Campione). The canton of Ticino, like all of Italian Switzerland, is, in fact, conquered territory.

When the strategic importance of the relevant passes is considered—Simplon, St. Gotthard, Lucomagno, San Bernardino (connecting the Val Mesocco with the Rheinwaldtal), Maloggia, Muretto, and Bernina—it is easy to understand why Switzerland strove to possess them. The consequent extension of Swiss territory encompassed areas purely Italian not only in population but also in type of cultivation. On the Swiss shores of Lake Lugano and Lake Maggiore the vine and mulberry and in some places even the olive flourish. The districts constituting the present canton of Ticino were severally joined to Switzerland at various times and were variously governed, but always as conquered territory, until 1803, when the Ticino became an independent state of the Confederation.

The population (160,680 in 1913) is altogether Italian both in dialect and culture and, moreover, is attached to Italy by strong economic interests; but it is much more closely attached to the Swiss Confederation because of the great political liberty granted by its constitution; so there is no marked tendency to reunite this region with the rest of Italy. Moreover it should be remarked that, while the canton of Ticino has furnished a considerable emigration, especially to the United States (the census of 1910 enumerated 14,923 Italian Swiss), it has experienced an intensive agricultural colonization by Lombard peasants, so that half of the present population of the canton is estimated to consist of families born in Italy who have established themselves there in the last fifty years. Then, too, the region, like almost all of Switzerland, is subject to an intense temporary immigration of Italian workmen and day laborers, who spend the working season there and return to their homes for the winter. Indeed, this periodic migration affects all the countries which border on Italy.

The Franco-Italian Contact Zone

In the western Alps there is no clean-cut boundary between the dialects which may be called Italian and those which should be regarded as French; in most cases only a trained philologist could decide whether certain valleys or districts ought to be placed on one side or the other of this boundary. It appears upon examination that, along the Riviera, the dialect spoken at Mentone is Provençal, while at Ventimiglia it is still Ligurian; so that the political boundary of Italy at this point does not diverge much from the dialectal boundary.

In the Alps of Liguria and Piedmont, however, the Provençal and Franco-Provençal dialects occupy all the upper valleys of the tributaries of the Po, in some places even approaching the plain, where Gallo-Italian dialects are spoken, which represent a transition between the Italian and French dialects.

The Italian literary language and culture, equally with the French, found a soil favorable for development among these different populations. The preference for one language or the other in a given region was usually dependent on its political affiliation or other historical vicissitudes. Hence, the boundary between the Italian and French literary languages does not coincide with that between the Italian and French dialects.

Number of French-Speaking People in Italy

From the last Italian census (1910) we can learn, not how many people speak the Provençal and Franco-Provençal dialects within the Italian boundaries, but only how many of them use French as the language of the church, of the school (where it is usually spoken along with Italian), and of culture in general. The census shows that 70,560 inhabitants of the administrative district of Aosta spoke French. In the valley of Aosta, Italy has actually kept French in the elementary schools, and in the churches French is used. In the Susa district there are 7,070 French in the villages of the upper Dora Riparia valley; this area is one of the territories east of the Alpine watershed which was longest under the rule of France (until the Treaty of Utrecht, 1713), and with France, too, it was further related by cultural and commercial contact through the Mont-Genèvre Pass. Next to the south lie the valleys of the Chisone and the Pellice, which are inhabited by the Waldensians, the well-known Protestant sect, which, after many persecutions in the Dauphiny and in Savoy, found a final refuge here. According to the census of 1910 there were 8,330 French-speaking people in the administrative district of Pinerolo, which includes these valleys. The dialect of the Waldensians is Provençal, differing, however, from that of the adjoining regions because the Waldensians came from the Dauphiny and settled in the territory which they now occupy only in the Middle Ages. The official language, as well as that of their church and culture, is French.

The Waldensians

It is important to remark that the official language of the Waldensians was Italian until they had to call in the services of pastors from Geneva, because almost all their own native pastors had fallen victims to the pestilence of 1630. The French literary language was thus introduced. It has since flourished because it conformed more closely to the character of the local idioms, but especially because it became, as it were, the symbol of their spirit of rebellion against the Church of Rome. While the French-speaking persons in the district of Pinerolo number 8,330 according to the Italian statistics, the Protestants of the same district, i. e. the Waldensians, number 14,841; the difference indicates that the Waldensians are largely bilingual. The total number of Waldensians is, however, much greater than these figures indicate, for they do not include the numerous colonies of that sect in Italy, elsewhere in Europe, and in the western hemisphere (especially in Uruguay).

Italian Populations in France: Nice

While some populations with Provençal and Franco-Provençal dialects and often even with French language and culture are thus included within the political boundaries of Italy, there are some populations with Italian dialects and Italian culture within the territory of France. To be sure, the only populations in France with Italian dialects are the inhabitants of that section of the middle valley of the Roia which, being included in the old County of Nice, was detached from Italy in 1860, when this county was ceded to France. Nice, with a good part of the Nice region, including also the principality of Monaco, was at that time prevailingly Italian in language and culture. But gradually, as the "Côte d'Azur," or French Riviera, has become one of the most frequented winter resorts of the world, the old traditional culture has grown weaker and in some places has even disappeared, so that the whole region, including Nice, the birthplace of Garibaldi, has become almost entirely French. The old character was but little fostered by th modern stream of Italian immigration to this region (the Italians numbe 30,000 in Nice alone). Beside the Côte d'Azur other centers of the sout coast have been affected by this immigration, especially Marseilles, wher there are about 100,000 Italians who were born in Italy. But their influenc was much less than the number would indicate, because for the most par their sojourn is temporary and they belong mostly to the laboring an servant class.

Italian Emigration to Southern France

This Italian migration into southern France, in its causes and its character, is of exactly the same type as that to Switzerland, Trieste and Fiume, and Austria-Hungary in general. The consequences of this migration, while identical in their influence on the economic and social conditions of the countries bordering on northern Italy, are very different in their effect on the spread of Italian culture. The Italians who change from temporary sojourners into permanent inhabitants of the countries which receive them are quickly assimilated in France, while in Italian Switzerland, in the Trentino, and in Julian Venetia they go to swell the Italian element and the strength of its resistance against the foreign elements.

The ethnographic and political consequences of this modern migration of Italians, which has taken place on so large a scale to the New World, within Europe itself, and to the Mediterranean countries, are not all evident, nor is this the place to consider them.

Bibliography*

G. Marinelli: Slavi, tedeschi, italiani nel cosidetto "litorale" austriaco, *Atti Ist. Ven.*, III, ser. VII, 1885.

M. G. Bartoli: Lettere Giuliane, Capodistria, 1903.

N. Krebs: Die Halbinsel Istrien, *Geogr. Abhandl.*, Vol. 9, No. 2, 1907.

P. S. Leicht: Le terre irredente nella storia d'Italia, Soc. Stor. Friulana, Udine, 1916.

F. Musoni: La Nazione slovena e l'attuale momento politico, Milan, 1916.

C. Battisti: Il Trentino, Novara, 1917.

A. R. Toniolo: Gli italiani nell'Alto Adige: Loro distribuzione ed espansione in rapporto alle condizioni geografiche della regione, *Archiv. per l'Alto Adige*, 1916.

Knapp, Borel, and Attinger: Dictionnaire géographique de la Suisse, Neuchâtel, 1908, article "Suisse."

C. Salvioni: I dialetti alpini d'Italia, *La Lettura*, August, 1901.

C. Salvioni: Ladinia e Italia, Pavia, 1917.

G. Morosi: L'odierno linguaggio dei Valdesi del Piemonte, *Archiv. Glottologico Italiano*, Rome, 1890.

C. Guarnier: Note sur la repartition des langues dans les Alpes occidentales, *Rev. de Géogr.*, 1897.

A. Rolando: Il confine italiano nelle Alpi Marittime, *Riv. Mensile del Club Alpino Italiano*, 1898.

---

* The bibliography of the subjects discussed in this paper is very extensive. Only a few of the most important or less known references are listed here.

HIGH-ALTITUDE FLYING IN RELATION TO EXPLORATION

By HENRY WOODHOUSE
Aero Club of America

There is no phase of aëronautical development that appeals to the geographer more keenly than the prospective use of the airplane in the exploration and mapping of the still unknown or little-known regions of the earth. In most cases the problem of such exploration involves the covering of areas of relatively great horizontal extent, requiring long-distance flights at low altitudes. A different type of problem, however, is encountered in the exploration of lofty mountain ranges, where high-altitude flying is involved. It is here proposed to discuss the vertical range of airplane flights in relation to this second type of exploration.

The trail of the airplane has already been carried over several of the world's famous ranges—over the Alps and the Andes; and new roads of conquest have been made in an interesting series of flights across the classic and forbidden ground of the Atlas. Last year three French aviators under the direction of Commandant Cheutin, Director of the French Air Service in Morocco, using Voisin bombing biplanes flew from Meknes to Bou Denib, crossing both the Middle Atlas and the High Atlas. The following day three small Nieuport pursuit-type biplanes made the return flight from Bou Denib to Meknes. One of the aviators continued on to Rabat. It was a flight of about 260 miles each way at heights of about 15,000 feet, because parts of the High Atlas are from 12,000 to 14,000 feet high. It was made successfully in a little over three hours. Previously Lieutenant Vasseur had crossed the High Atlas from Agadir and Marrakech. The mountain flying that has already been accomplished encourages aviator and geographer to look towards the conquest of the loftiest and least attainable of the world's ranges—the Himalaya.[1]

High-Altitude versus Long-Distance Flights

Certain remarkable developments that have taken place in aëronautic art and science in the past six months make the problem of crossing the Himalaya seem easier to solve than the problems of certain proposed long-distance flights. It appears easier than the problems connected with the proposed transatlantic flights—which include seven different plans[2]—or those connected with the projects of Rear Admiral Robert E. Peary and

---

[1] For a suggestive paper bearing on the topic see A. M. Kellas: The Possibility of Aerial Reconnaissance in the Himalaya, *Geogr. Journ.*, Vol. 51, 1918, pp. 374-389.

[2] See a number of articles in *Flying*, Vol. 7, 1918-19, pp. 508-521, especially p. 521.

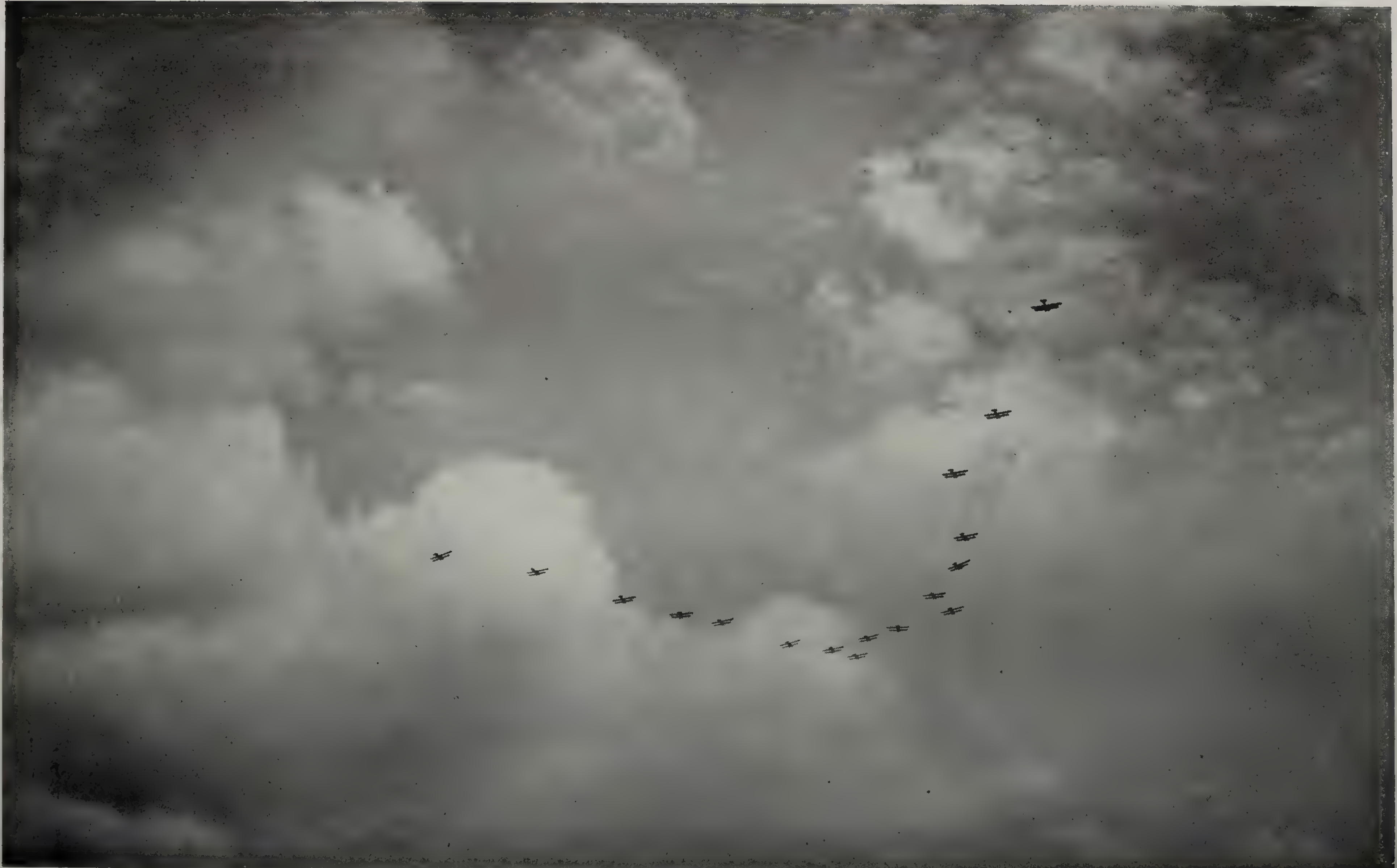


FIG. 1—**Airplanes flying in battle formation**, Rockwell Field, San Diego, Cal. The birdlike

aptain Robert A. Bartlett, which provide for flights from Cape Aldrich o the North Pole and back, and from Cape Aldrich to Cape Chelyuskin, n the Siberian side.

In crossing and flying over the Himalaya there is really only one cardinal actor to be considered—*great altitude.* In Arctic exploration and transtlantic flight we have three other requirements to be met:

(1) A sustained flight, twice as long as the longest yet made.

(2) From ten to twenty-five hours continuous service of the pilots on the airplane.

(3) The use of instruments for determining the course when astronomical observations, "shooting" the horizon, and ascertaining the airplane's speed and drift are, to put it mildly, difficult.

Furthermore great altitude has had to be considered as a factor in making plans for Arctic or transatlantic flight because the present-day airplane is just large enough to carry the load necessary to make a continuous flight from St. Johns, Newfoundland, to Ireland, without much margin and there may, therefore, be an advantage in flying at altitudes of from 15,000 to 25,000 feet in order to gain the increase of speed afforded through the help of the winds prevailing at those altitudes.

FLYING OVER THE HIMALAYA

The problem of flying over the Himalaya resolves itself into three parts:

(1) Crossing the mountains by flying through the passes or gorges or by passage over the main range and avoidance of the high peaks.

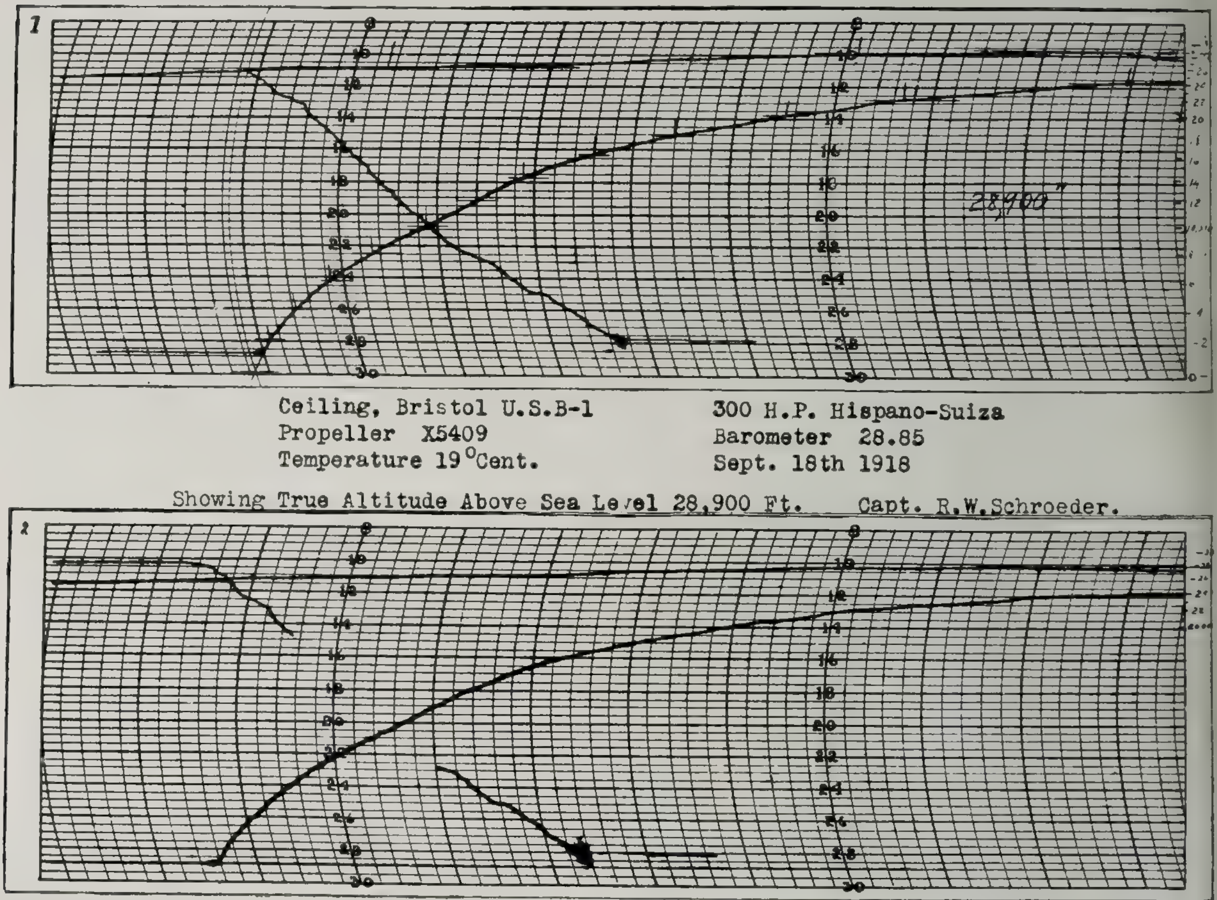
(2) Flying over the highest peaks, including Mt. Everest, which is 29,002 feet, and Mt. Kangchenjhau, which is almost as high.

(3) Making a landing on the ranges.

According to Dr. Kellas the main range could be crossed at an altitude of 23,000 to 25,000 feet by avoiding the peaks that are over 24,000 feet high, of which, so far as is known, there are about eighty. Further, by utilizing passes or gorges transit could be made at a still lower elevation—not over 19,000 feet. These altitudes can be reached by present-day airplanes. There are a great many airplanes used by the British and the other Allied nations that have a "ceiling" (maximum altitude attainable by the plane) of approximately 30,000 feet with the usual military load; and the flight across the Himalaya through the gorges and passes would not be considered more difficult than the flights made daily over the enemy's barrage fire, where in addition every cloud may hide a squadron of enemy fighting planes. It certainly would not be as difficult as was the flight of the squadron of Italian S. V. A. single-motored biplanes that, under the command of Major Gabriele d'Annunzio on August 10, 1918, flew from Venice to Vienna, a trip which involved more than two hours' flying over the Alps. In regard to the altitudes attainable by airplanes in present use we have certain recently established records.

RECORD ALTITUDES REACHED BY AIRPLANE

On August 12, 1918, Captain (now Major) R. W. Schroeder made a record flight of 26,850 feet at the Wilbur Wright Field, Dayton, Ohio. A few weeks later he established a new record, going up to 28,900 feet (corrected altitude), only a hundred feet less than the height of Mt. Everest. Major Schroeder has described his experiences.[3] The flight was the culmination of a series of experiments and of continuous experience in high-altitude flying. "I had been to 12,000 feet at different times and experienced no difficulties," says Major Schroeder. "After being put in charge of the Testing Squadron at Wilbur Wright Field, my duties required me to go to the ceiling with all new types of high-powered battle aëroplanes, which were being experimented with by the United States Government. . . . During these trips I would quite often go without the use of oxygen, and in time I discovered that I was becoming accustomed to the rare, thin air. However, I did not seem to be able to go above 23,000 feet at any time without feeling a sort of sleepy, tired, cross, and hungry feeling, which I was unable to overcome except by the use of oxygen." This would seem to be a confirmation of the suggestion put forward by



Ceiling, Bristol U.S.B-1
Propeller X5409
Temperature 19 °Cent.

300 H.P. Hispano-Suiza
Barometer 28.85
Sept. 18th 1918

Showing True Altitude Above Sea Level 28,900 Ft. Capt. R.W.Schroeder.

FIG. 2—Barograph curves of Major Schroeder's record flight of 28,900 feet on September 18, 1918. The scale of feet is on the right. Both barographs were calibrated by the Bureau of Standards and also calibrated in the McCook Field laboratories just before the flight.

---

[3] See R. W. Schroeder: How I Made the Altitude Record of 28,900 Feet, *Flying*, Vol. 7, 1918-19, pp. 906-907.

r. Kellas, "It is quite possible that by repeated trial flights from sea evel to 22,000 to 25,000 feet, using oxygen only when absolutely necessary, he alveolar epithelium might be educated to make the most of a minimum upply of oxygen."[4]

Respecting his record flight Major Schroeder reports that at 27,000 feet e began to suffer from the cold, raw air; but he kept on climbing until his xygen supply began to give out, and shortly afterward the motor stopped or lack of gasoline. At the maximum height the thermometer registered —32° C. Hands and face became numb, and on descent lips and fingers were found to be frozen and in need of medical attention. Major Schroeder, however, expressed the opinion that with a few changes and improvements in equipment he should be able to get up to 30,000 feet or more.

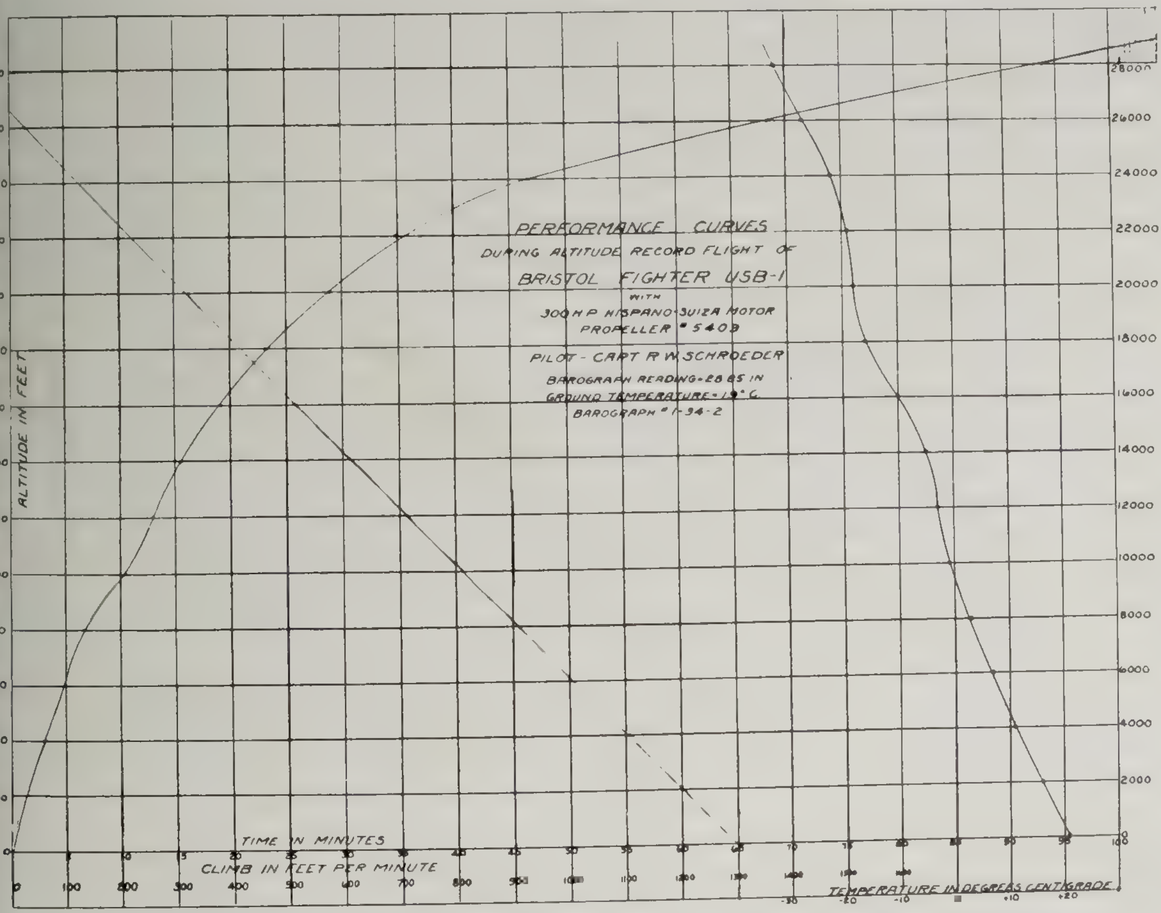


FIG. 3—Performance curve of Major Schroeder's record flight. To the right is also shown the curve of temperatures. At the highest altitude the temperature of −32° C. was recorded.

On January 2 of this year Major Schroeder's record was broken at Ipswich, England, by a British aviator, Captain Andrew Lang, who climbed to 30,500 feet. Captain Lang's observer fainted through lack of oxygen, his supply pipe having been broken by the vibration, and on descending both observer and pilot were suffering from frostbite. Commenting on the performance, *Nature* remarks: "the height attained was limited by the failure of petrol-pump pressure, due to the rarity of the air, and not by the aërodynamic performance of the machine'' . . . . ''It would appear, however, that even greater heights could be reached if minor difficulties, such as those connected with carburation at low temperatures and the maintenance of the pilot's comfort, were overcome.''[5]

---

[4] Article cited in footnote 1, p. 380.

THE MECHANICAL PROBLEM OF FLYING OVER THE HIGHEST PEAKS

To carry out the project of flying over Mt. Everest and Mt. Kangchenjhau it will be necessary to build special airplanes. It is of little value from a military viewpoint to have a plane with a ceiling of 35,000 feet unless it can carry guns and munitions and the pilot can patrol for about two hours. In addition, the machine must have a maximum equipment of safety to enable the pilot to make vertical turns, to do the ''roll,'' the ''falling leaf,'' the ''Immermann turn,'' the ''nose dive,'' the ''loop,'' and other similar maneuvers that may be necessary in the course of an aërial flight; the machine must also have a very high horse-power motor to insure maximum speed.

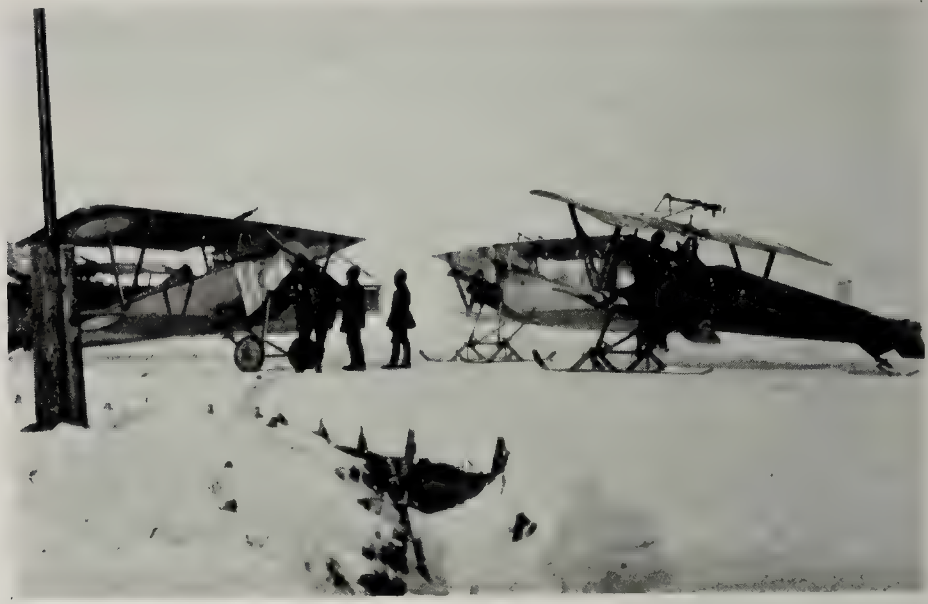


FIG. 4—Russian aviators starting for flights in mid-winter. The airplanes on the right are equipped with skids for snow-landing instead of with wheels, as in the usual type on the left.

The explorer can dispense with machine guns and ammunition, although he should carry a gun for protection in case he lands away from his starting point. He can also dispense with one hour's fuel, and the construction of the machine can be lighter. But these two considerations should come last. The greatest saving in weight will be in having a smaller motor—and correspondingly less fuel and tankage.

FLYING AT LOW TEMPERATURES

The writer has followed closely the progress made towards the solution of the problems of winter flying since 1914, when he was asked by the riends of Vilhjálmur Stefánsson whether it would be possible to use airlanes in connection with a proposed relief expedition. The plan looked lifficult at the time, but, considering the stakes involved, the chances of uccess seemed sufficient to justify the undertaking. It was, however, a lan which could be carried into effect only during the six or eight weeks f summer weather. The airplanes could be got together, but the rest of he expedition could not be organized in time; therefore the plan had to e given up. But the project for aviation in the Arctic did not end there.

---

[5] *Nature*, No. 2567, Vol. 102, 1919, Jan. 9, p. 369.

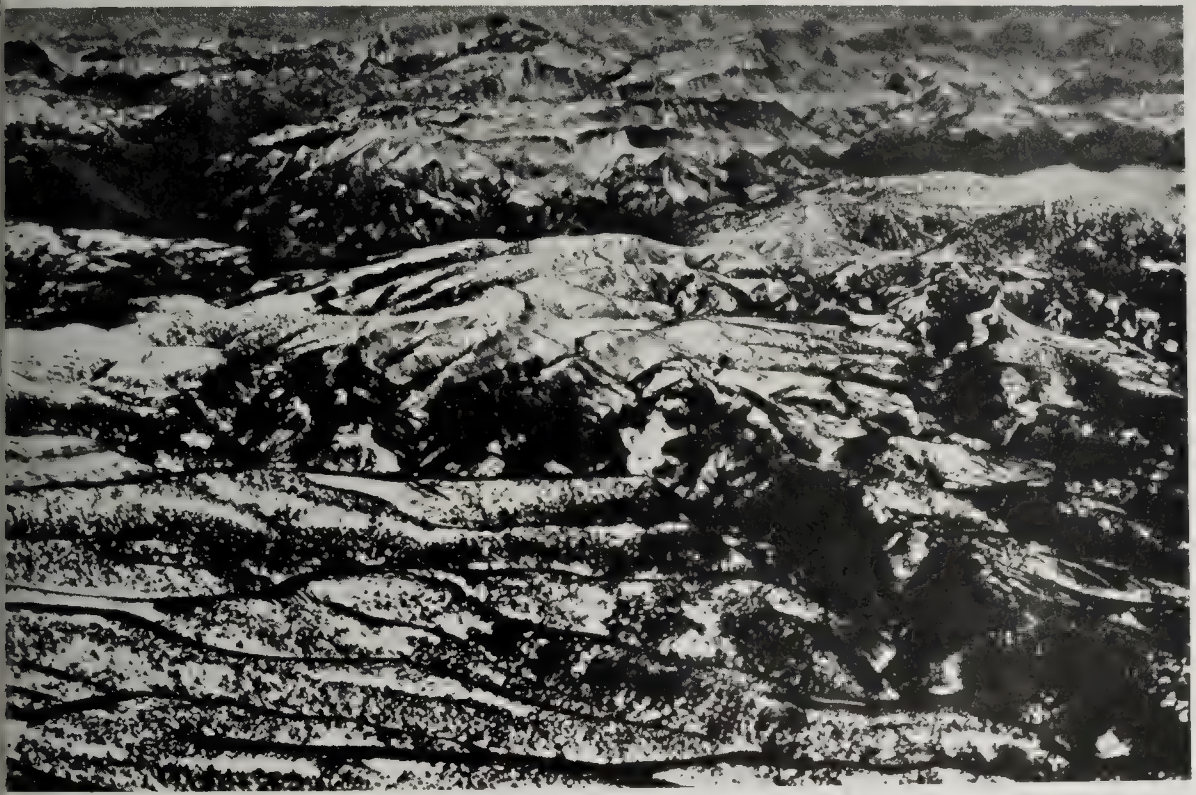


Fig. 5—The High Atlas photographed from one of the French military airplanes that flew over the ange. The higher crests are visible in the extreme background.

In 1916 Admiral Peary opened another opportunity for the writer to study the subject in connection with Captain Robert A. Bartlett's project to fly from Cape Aldrich to Cape Chelyuskin. Captain Bartlett's plan would have been carried out in 1917 had not the war prevented. Today the vision of these two hardy American explorers seems to be well on the way towards materialization. The Aero Club of America plans to send out an aërial polar expedition under Captain Bartlett in June, 1919.[6] The experiences of its members will contribute not only to the solution of the immediate problem but also to our general knowledge of flying in relation to snow and ice surfaces—knowledge that may well prove helpful on the Himalaya.

A great deal of flying in cold weather and over snow surfaces was done on the different battle fronts in the winter of 1917-1918, as well as at the aviation schools in Canada and the United States, and considerable data and photographs were collected at the time. The writer also had occasion to question Russian aviators regarding their experiences in flying in Russia during the winter of 1917-1918, under conditions which were probably more severe than aviators would meet in flying over the Himalaya ranges. They were obliged to fly daily for months and to face German anti-aircraft guns and German airplanes. All observations go to show that the solution of the problem of flying in cold weather consists largely in providing suitable clothing for the aviator. Furthermore the airplane can itself be equipped to give a certain protection. The military aviator cannot be enclosed in a cabin, to be sure, but the explorer can be protected by a hood of transparent material. The sides and bottom of the plane can also be constructed of transparent material, which will give him a clear and wide view and permit him to see everything about him as he flies.

---

[6] See: Captain Bartlett's Arctic Expedition, *Flying*, Vol. 7, 1918-19, pp. 1148-1149.

Physiological Effects of High Altitudes

At high altitudes the effect of the rarefaction of the air is more important than the influence of the low temperature. The effect on aviators of flying at high altitudes is a matter about which there are as yet no exact data. Ever since aviators began to fly above the 2,000-foot mark we have been hearing of possible physiological effects. Only a very small percentage of aviators complain of physiological difficulties. The proportion is probably not larger than is to be found in practically every other line of human activity.

The effect of mountain climbing is not a good criterion from which to judge the effect of high flying, just as the sensation of looking down from a high building is no criterion from which to judge the sensation of looking down from an airplane while flying. The aviator has this advantage over the mountain climber, that he can start out in perfect physical condition and can accomplish the entire journey in a few hours, whereas it would take the mountain climber days or weeks. Reports carefully kept by the writer of the experience of aviators and balloonists who have made altitude records show that flying at high altitudes is by no means as difficult as it is thought to be.

History has recorded several deaths as attributable to rising to high altitudes without a proper supply of oxygen. Whether history is right or not, remains for the future to prove. H. F. Sivel and J. E. Crocé-Spinelli met their death in April, 1878, in ascending to 28,200 feet in a balloon; and the Germans, Arthur Berson and R. J. Süring, who reached an altitude of 35,000 feet (accepted as the record) in 1901, descended in rather bad condition. These cases were attributed to altitude sickness (hypsozemia); but the writer is led to believe from his own experience that those pioneers may have been victims of asphyxiation, owing to their rising so fast that they were suffocated by gas escaping from their balloon. Another remarkable balloon ascent was made in May, 1913, by three Frenchmen, acques Schneider, Maurice Bienaimé, and Albert Senouique. M. Schneider eported the experiences of his party in *Flying* for January, 1914.

At 2.35 we attained the 7,000 meters altitude. The view below was less clear; a hick layer of cirrus enveloped us and moved slowly like shifting mountains of light wadding. At 3.00 o'clock we reached 8,000 meters and we met snow which troubled omewhat our progress in altitude. At 3.15 we had reached a height of 9,000 meters nd at 3.32 Mr. Bienaimé, who had taken his turn in service, emptied the 109th bag of ballast. At 3.35 we reached the height of 10,081 meters. Besides the equipment we only had on board three bags of ballast. We passed our time in making observations. Mr. Senouique tried his strength on the dynamometer. On earth it was 105; it now passed 110. That of Mr. Bienaimé, which was 140 on earth, was now 155. This indicated a similar increase in proportion. The ultra-violet rays were found to be more numerous here, and their intensity was remarkable. . . . We began to descend at 3.40; we were at 8,000 meters at 4.14; our speed of descent was, therefore, 166 meters per minute. There the bag took a fusiform shape and our parachute, which had been stiff until now, began to flap. At 3,000 meters we finally took off our oxygen masks, which we had lifted on several occasions during the ascension, so as to make note of physiological phenomena. I want here to express my admiration for the courage and devotion to science of our eminent friend, Mr. Senouique, for the very convincing experiments which he made at the greatest altitudes. We conducted these under most trying con-

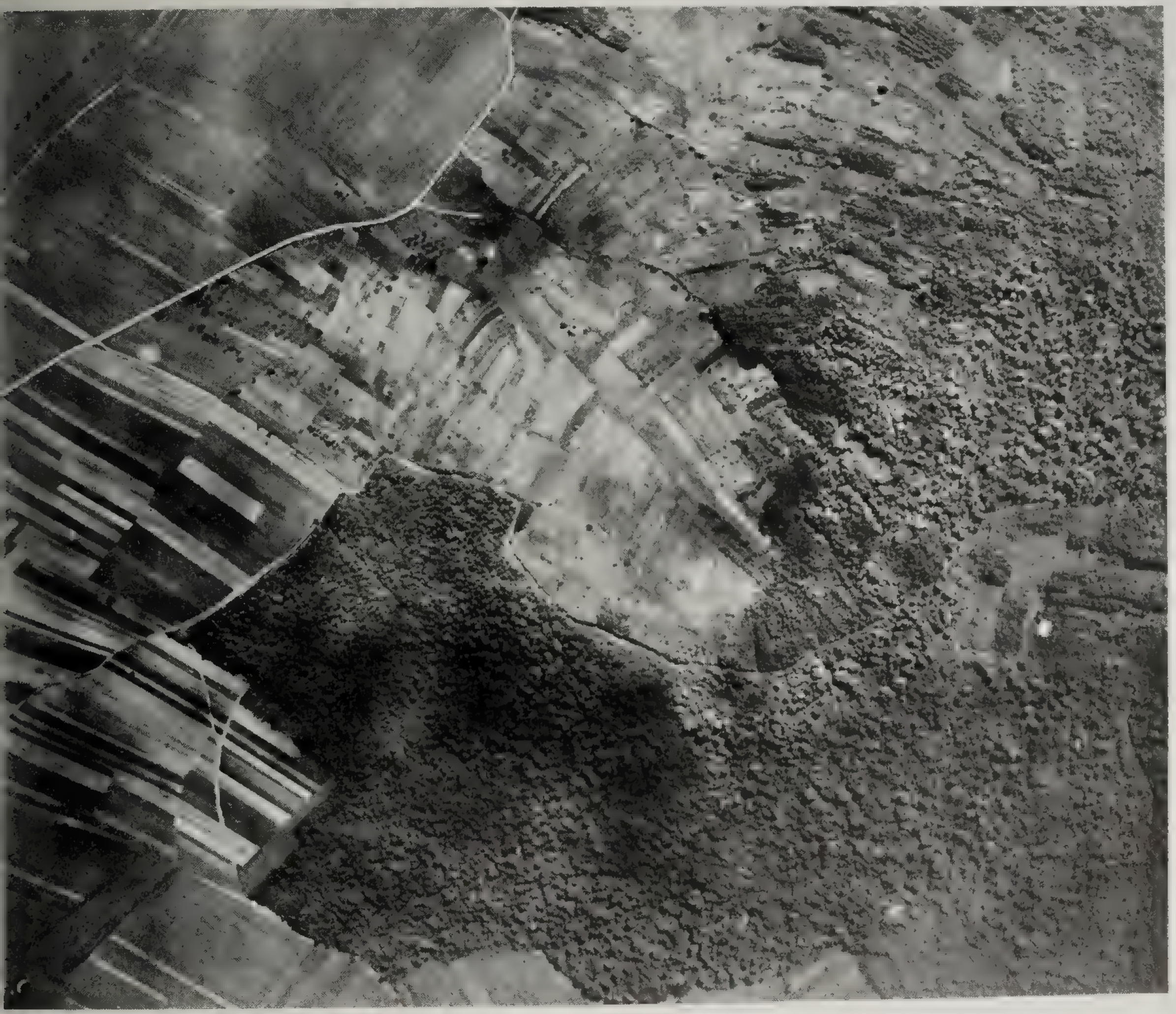


FIG. 6—Photograph from an airplane of an area in northeastern France from an altitude of 8,500 feet. Aërial photography is the most important adjunct of exploration by aircraft.

ditions: at 10,000 meters, when one's heart is beating at a rate of 110 pulsations p minute, producing in the arteries and in the veins a pressure equal to a column of abo 25 centimeters of mercury; when the exterior pressure was 210 millimeters, and tl interior pressure 250 millimeters—which produces in the tissue of the circulation syste a tension powerful enough to cause death.

Mr. Alan R. Hawley, President of the Aero Club of America, and M Augustus Post in their many balloon ascensions have reached heights o over 25,000 feet. In one of the National Balloon Races they rose to a heigh of 25,000 feet; during the St. Louis-to-Canada trip they remained fo about six hours at a height of some 15,000 feet. Breathing was a littl hard, but they felt no ill effects afterward.

The physiology of high-altitude flying is an interesting and importan subject; with the increasing need of knowledge in regard to it, it is hope that reliable data will be collected on which definite conclusions can b based.

Landing Airplanes on the Himalaya

Landing airplanes on such surfaces as the Himalaya may be expected to present, and starting again, will be mainly a matter of skill and organization. A specially made airplane for flying at high altitudes may not have a speed of more than 75 or 80 miles an hour and would have a very low landing speed. It would also be a very light machine and, if possessing a margin of power, could rise from a flat clearance of from 400 to 500 feet. In preliminary flights the aviator could drop tents, bags of food and equipment, and spare parts on a selected spot near the place where he intended to land. Dropping these things from an airplane would not be difficult. It was done repeatedly by the British aviators at Kut. Italian aviators also dropped bread and provisions on the mountains for their forces which had been cut off from their lines of communication and had exhausted their supplies. The aviators carried sufficient food and provisions to last them many days.

Having carried and dropped all the equipment necessary, the aviator could then attempt the landing. It would be well for him to carry a passenger in order to have some one ready to assist him in case he found it necessary to make repairs, or ready to arrange for the return trip on foot in case he found it impossible to start again.

It is hardly necessary to go further in speculating regarding the possibilities of landing on and starting from the Himalaya. Wherever there is a clearing of from 500 to 1,000 feet, there an airplane can land and from thence it can start. Instances of suitable locations are given by Dr. Kellas.[7]

The challenging barrier of the Himalaya will succumb to the airman. Mt. Everest and Mt. Kangchenjhau will stand as milestones in the history of man's conquest of the air and as landmarks to the airmen who will link British India with other civilized centers.

---

[7] Article cited in footnote 1, p. 379.

RAISED BOGS IN EASTERN MAINE

By GEORGE E. NICHOLS
Yale University

OCCURRENCE OF SURGICAL SPHAGNUM

During the summer of 1918 the writer, acting in the capacity of Botanical Adviser on Sphagnum for the American Red Cross, was called upon to secure information regarding the location in the East of sources of supply for sphagnum moss suitable for use in surgical dressings. Sphagnum was being used on a vast scale abroad and in Canada as a substitute for absorbent cotton in making pads or compresses and had proved itself singularly adapted to this purpose by reason of its very high absorptive capacity.[1] In March, 1918, it had been officially adopted by the American Red Cross as a standard surgical material. But, while there were known to be extensive areas of suitable moss in the Pacific Northwest, very few data were available regarding its occurrence in the East. There had been, and there continued to be, reports of good material from various sections; but investigation of these, as well as other sources of information, had seemed to indicate that throughout most of the eastern United States sphagnum of the quality required for surgical work, if not entirely absent, was either very local in its occurrence or else present in too small amounts to be of practical value. It was known, however, that in southern New Brunswick and in parts of Cape Breton, there were abundant supplies of high-grade surgical sphagnum.

ITS ASSOCIATION WITH RAISED BOGS

It was also known that in these regions raised bogs were of frequent or even common occurrence. The theory therefore suggested itself that the raised bog might well be taken as an indicator of climatic conditions suitable to the growth of surgical sphagnum. In other words, since a raised bog is itself largely built up by various species of sphagnum and since it is dependent for its existence on precisely those climatic conditions which are congenial to the development of surgical sphagnum, it naturally follows that surgical sphagnum is to be looked for in greatest abundance and luxuriance in regions where raised bogs are well developed. With this deduction in mind, it was decided that the region in the eastern United States where the chances of success in locating supplies of surgical moss were the most favorable lay along the coast of eastern Maine. For, while there was very little favorable evidence in the way of either reports or

---

[1] **For a somewhat detailed discussion of this subject see the writer's article:** The Sphagnum Moss and **Its Use in Surgical Dressings,** *Journ. New York Botanical Garden,* Vol. 19, 1918, pp. 203-220; also reprinted in *Scientific American Suppl, No. 2237,* **Vol. 86, 1918,** Nov. 16, pp. 308-311, under the title "Are You Collecting **Sphagnum?"**

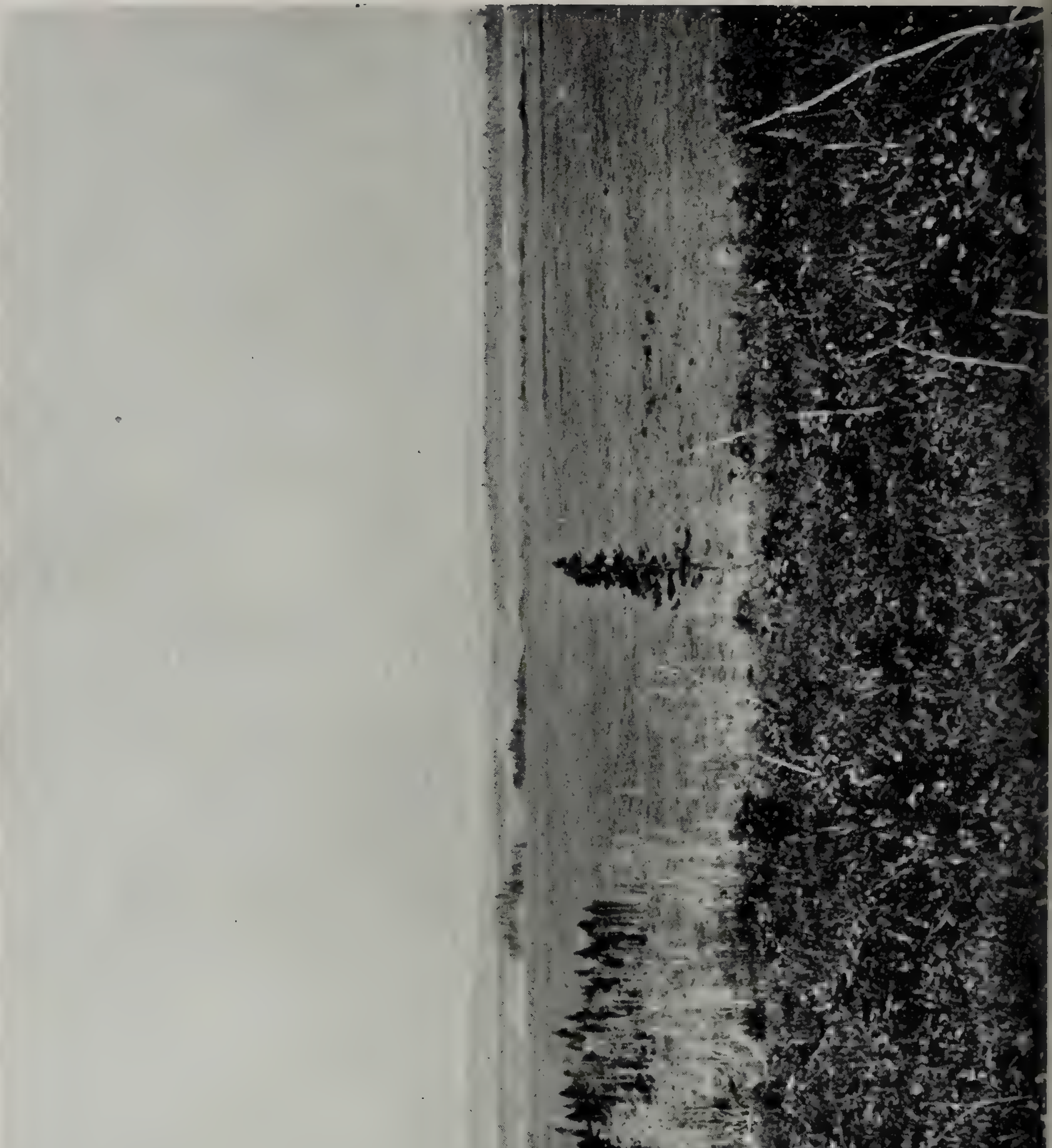


Fig. 1

herbarium specimens, it was known that eastern Maine was a very boggy country and also, in a vague way, that some at least of the bogs were of the raised type.

THE FIELD INVESTIGATED

Altogether, one month was spent in this region. Starting in at Portland and at Wayne (situated approximately 50 miles north of Portland) investigations were conducted in the vicinity of fourteen different towns between there and Calais, which lies on the Canadian border. In nearly all of these localities an automobile was placed at the writer's disposal during his stay, so that it was possible to cover a great deal of territory within the limited time available. In addition, in many places a competent guide was provided, which facilitated matters greatly. Under the circumstances it was of course impossible to make any detailed studies along strictly botanical lines, and very few written data were secured; but it was equally impossible to neglect entirely the ecological aspects of the trip, particularly certain very obvious facts regarding the occurrence and general features of the raised bogs in this region. It is these which form the principal theme of the present paper.

STATE OF KNOWLEDGE REGARDING NORTH AMERICAN RAISED BOGS

The raised bog or high moor is one of the most remarkable of all swamp types. It is a type of swamp extensively developed in parts of northern Europe and has been described in great detail by various European scientists. But comparatively little has been written regarding these swamps in North America. Shaler, in his monograph on the freshwater morasses of the United States, seems to have been the first to call attention to their occurrence on this continent. His observations were as follows:

> In northern Europe and elsewhere the species of sphagnum often develop luxuriantly on slopes having a declivity of as much as 5°, so that the bog may rise to the height of some scores of feet above the level of the water in which it originates and may ultimately come to have many times its original horizontal extent. Within the limits of the United States the summers are generally so hot and dry that the climbing bogs due to sphagnum growth are of inconsiderable extent and rarely have an inclination of more than 2°. The American instances of these climbing bogs which I have observed are mostly limited to the eastern portion of Maine, near the shores of the Bay of Fundy. Faint traces of the same mode of growth are observable in certain areas of New Hampshire, and in a yet slighter measure in the northern part of Michigan and Minnesota. Even as far south as the swamps of Virginia and Carolina the sphagnum grows weakly above the level of permanent water, but it does not form a sufficiently thick mat to induce a permanent marshy character on the surface. I have never seen the coating of humus produced by it with a thickness of more than six inches in that part of the country.[2]

Ganong was the first to publish an adequate description of this unique type of swamp in North America. He discussed in considerable detail the raised bogs in that part of the Province of New Brunswick bordering the

---

[2] N. S. Shaler: General Account of the Fresh-Water Morasses of the United States, with a Description of the Dismal Swamp District of Virginia and North Carolina, *10th Ann. Rept. U. S. Geol. Survey*, 1888-89, Part I, pp. 255-339; reference on p. 286.

Bay of Fundy and indicated the occurrence of similar tracts in Nova Scotia, Anticosti, and Newfoundland.[3] In a later paper he described the raised bogs found on Miscou Island, in northern New Brunswick.[4] More recently Anrep has given a brief account of certain raised bogs on the peninsula of Nova Scotia and has indicated the absence of bogs of this type from those parts of Manitoba, Ontario, and Quebec which he had explored.[5]

The writer of the present article has described at some length the raised bogs of northern Cape Breton[6] and has noted the marked resemblance which these bear to those described by Ganong in New Brunswick. It was remarked that in all probability the raised bog is a not infrequent type of swamp along the Maine coast as far south as the vicinity of Portland, and that it evidently is of quite common occurrence northeastward. This conclusion was based very largely on scattered observations made by Bastin and Davis in their report on the peat deposits of Maine, Shaler's remarks having unfortunately been overlooked. Bastin and Davis distinguished between two types of peat deposit: "the filled basin, in which most of the material has been gathered below a permanent water level, and the built-up plain, in which the water level may be practically always below the surface of the peat, but in which it rises, either steadily or periodically, as the remains of plants collect."[7] Bogs of the latter type the authors also designated as "built-up bogs" but, whether intentionally or not, they did not employ the terms "raised bog" or "high moor."

But although in a general way it is to be inferred from the Bastin and Davis report that many Maine bogs belong to the built-up type, in only a very few instances out of the seventy swamp tracts treated do they clearly indicate whether the surface in specific bogs is flat or convex, or whether these belong to the filled-in or to the built-up type. Yet it would seem to the writer that the contour of the surface of a deposit ought naturally to be one of the first things noted by a peat investigator; since surely a dome-shaped bog, especially one overlying a nearly flat land surface, must be far more easy to work than a flat bog formed in a water-filled depression.

COASTAL REGION OF MAINE THE CHIEF AREA OF DEVELOPMENT IN THE EASTERN UNITED STATES

During the summer of 1917, in company with Dr. Harold St. John of the Gray Herbarium, the writer traveled by canoe from Moosehead Lake, n northwestern Maine, northward up the northeast branch of the Penob- cot River, across by carry into the headwaters of the St. John River, and hence down the St. John to Fort Kent, a distance altogether of about two hundred miles. Nowhere along this route was anything in the nature of a raised bog encountered. In view of these and other observations it seems safe to assert: (1) that in the state of Maine raised bogs, in so far as they constitute a distinctive swamp type, are virtually restricted to the prox-mity of the seacoast; and (2) that in other portions of New England and of the eastern United States this type of bog is practically absent, although in occasional swamps it is possible to detect a slight elevation of the surface above the level of permanent ground water.

---

[3] W. F. Ganong: On Raised Peat-Bogs in New Brunswick, *Botanical Gazette*, Vol. 16, 1891, pp. 123-126.

Idem: Upon Raised Peat-Bogs in the Province of New Brunswick, *Trans. Royal Soc. of Canada*, 2d Ser., Vol. 3, Section IV, 1897, pp. 131-163.

[4] *Idem:* On the Physical Geography of Miscou, *Bull. Nat. Hist. Soc. of New Brunswick No. 24*, St. John, N. B., 1906, pp. 447-462.

[5] A. Anrep: Investigation of the Peat Bogs and the Peat Industry in Canada, 1913-14, *Canada Dept. of Mines Branch Publ. 351*, Ottawa, 1915.

[6] G. E. Nichols: The Vegetation of Northern Cape Breton Island, Nova Scotia, *Trans. Conn. Acad. Arts and Sci.*, Vol. 22, 1918, pp. 249-467; see especially pp. 433-456.

[7] E. S. Bastin and C. A. Davis: Peat Deposits of Maine, *U. S. Geol. Surv. Bull. 376*, Washington, D. C., 1909.

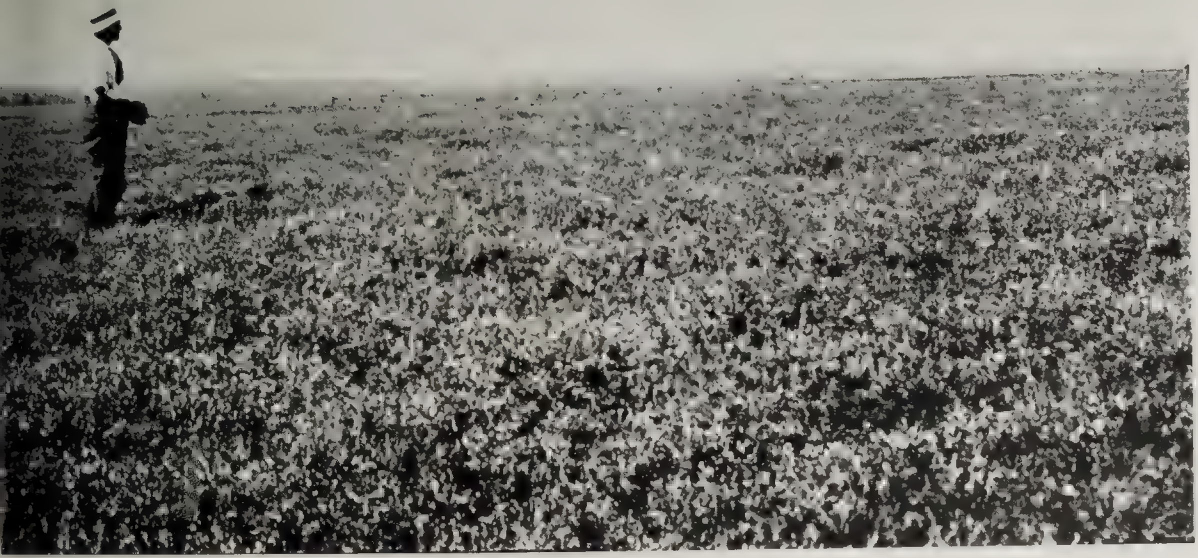


Fig. 2—A characteristic view of the vegetation in the Denbo Heath, a raised bog at Deblois, Maine. A dense growth of low shrubs, mainly members of the heath family, covers the surface over much of the bog.

Description of Raised Bogs Along the Maine Coast

An itinerary of the route covered by the writer in eastern Maine during the summer of 1918 is given below, together with brief observations regarding the occurrence, etc., of raised bogs in this region.

Portland. No raised bogs were seen or reported in this vicinity, although several flat bogs were visited. Bogs of any description, however, are comparatively infrequent.

Wayne. This region abounds in bogs of the flat type.[8] Of the fifteen bogs visited, only one (Burr, Area 8) is distinctively of the raised type, and even in this case the elevation of the center above the margin is slight, scarcely two or three feet.

---

[8] See F. F. Burr: The Occurrence of Peat in the Livermore Quadrangle, Maine, *2d Ann. Rept. Public Utilities Commission, State of Maine, for the Year Ending Oct. 31, 1916*, Waterville, 1917, pp. 76-97.

Augusta. The Great Sydney Bog, situated about five miles north of this city (Bastin and Davis, Locality 25), is a typical raised bog. It covers an area of about one square mile and exhibits the convex surface contour so characteristic of raised bogs. Between the lower parts along the margin and the higher parts toward the center there is a vertical difference in elevation of more than six feet (measured with hand level). The northeast portions of the bog are lower than the southwest, but it apparently is drained by brooks at either end. Eighty miles of travel in the vicinity of Augusta failed to reveal any other raised bogs.

Waldoboro. About fifteen bogs were visited in this swampy district. Several of these appeared to be of the "built-up" type (having been formed over flat ground rather than in a depression), but in only one instance was the domed surface contour evident. In this case, a small bog bordering Sidensparker Pond, there is a rise of two or three feet from margin to center.

Rockland. A large bog situated about two miles west of this city (Bastin and Davis, Locality 29) and covering an area of somewhat over a square mile obviously belongs to the built-up type. It is perhaps four feet higher toward the center than around the lower parts of the margin. Bogs of any description are infrequent in this vicinity.

Belfast. The region about Quantabacook Pond, a dozen miles west of Belfast, abounds in bogs, many of them large. Some of them are slightly raised, but most of them are of the flat type.

Bangor. The Hermon Bog (Bastin and Davis, Locality 38), situated four miles west of Bangor, is a very fair example of a raised bog, definitely convex in surface contour and rising perhaps five feet from margin to center. It is about a square mile in area. The Chemo Pond bog, in the town of Bradley, about ten miles east of Bangor, was not seen but is judged from reports to be a large raised bog.

Old Town. Bordering Pushaw Lake, and mostly in the town of Old Town, is an immense bog many square miles in area (Bastin and Davis, Locality 41). In large part the bog surface appears flat, but in many places, as south of Mud Pond, it has been built up well above the level of the lake. Northwest of Old Town, bordering Birch Stream, in the town of Alton, for several miles, is an immense bog of the built-up type (Bastin and Davis, Locality 34); but the surface, so far as observed, is only slightly elevated above that of the clay flat which it overlies. The bog bordering Holland Pond in Alton (Bastin and Davis, Locality 33) rises several feet above the level of the pond. None of the bogs visited from either Bangor or Old Town compare with those seen farther east in the height to which the surface has been elevated.

Ellsworth and Franklin. Of the dozen bogs visited in this vicinity, Garland's Heath, situated along the western edge of Union River about six miles north of Ellsworth, is a fine specimen of raised bog. It occupies an area of about a square mile and exhibits a conspicuously convex surface contour, rising more than ten feet vertically from margin to center. The presence of several other raised bogs in this vicinity is suggested from a study of the map. A number of these areas are specifically designated as "heath" (locally pronounced "haythe" or "hake"), a term which throughout eastern Maine is employed primarily (though unconsciously) with reference to raised bogs. For reasons which will be given later no attempt was made to visit these bogs.

Cherryfield and Columbia Falls. Four very characteristic raised bogs were visited in this section and a number of others were seen from a distance. One of those visited is a small bog, perhaps forty acres in extent, lying about three miles northeast of Cherryfield (Bastin and Davis, Locality 48). Its domed surface rises perhaps six feet from margin to center. A much larger raised bog is situated in the town of Deblois, about fifteen miles north-northwest of Cherryfield (Figs. 1, 2). Locally this is known as the Denbo Heath. Its area is unknown, but it must cover several square miles. In height it surpasses any of the bogs yet mentioned, its domed center rising fully eighteen feet (measured with hand level) higher than the margin. The Great Columbia Bog (Bastin and Davis, Locality 49) is probably still larger, covering altogether an area estimated at about five square miles along the Pleasant River. Its southern margin lies about six miles northwest of Columbia Falls, but it was also visited from the Cherryfield side—a somewhat longer journey. Regarding this area Bastin and Davis write: "Only the western portion of the bog . . . was tested, but test holes . . . failed to show more than three feet of mucky peat. It is possible, though hardly likely, that in other parts of the bog the depth of the peat may be greater." Yet less than two miles east of the area just referred to there is an immense raised bog which rises, if anything, to an even higher elevation than the Denbo Heath. The surface in places must be underlain by fully twenty feet of peat. No accurate measurements were taken. The fourth raised bog visited in this vicinity is situated a few miles northeast of the village of Columbia Falls. It is about one square mile in area and rises ten or more feet toward the center.

Machias. Several raised bogs were noted in this vicinity, but only one, a small one, was visited. For reasons which will be obvious presently attention was focused primarily on the flat bogs bordering lakes and ponds. The region east of Machias, between there and Lubec, was not explored, but a study of the map and of the Bastin and Davis report leaves little doubt that the raised bog is a common type in this section.

Calais. Along the western shore of Meddybemps Lake, ten miles southwest of Calais, there are several good-sized and very characteristic raised bogs. Similar bogs doubtless occur along many of the other lakes, in which this wild section of the country abounds.

General Distribution of Raised Bogs Along the Maine Coast

The observations set forth in the preceding paragraphs may be summarized as follows. (1) Raised bogs occur in greater or less abundance along much of the Maine coast east of Casco Bay. (2) They are most frequent and reach their best development east of Penobscot Bay. (3) In Washington County they are a common bog type and attain large proportions, frequently covering considerable tracts of country. (4) West of Penobscot Bay raised bogs are infrequent and, on the whole, poorly developed, although there is at least one conspicuous exception—the Great Sydney Bog. (5) How far away from the coast raised bogs, as a distinctive swamp type, occur has not been determined, but the Great Sydney Bog lies fully thirty miles inland.

It seems unnecessary here to say anything regarding the origin, vegetation, and other features of raised bogs in Maine. So far as observed, they seem to agree in practically every respect with the raised bogs of New Brunswick and northern Cape Breton, which have been amply described by Ganong[9] and the writer.[10]

Geographical and Local Distribution of Surgical Sphagnum

A few further remarks regarding the distribution of species and qualities of sphagnum suitable for surgical use may be of relevant interest. In so far as their geographical distribution is concerned, the assumed indicator significance of the raised bog, elsewhere suggested, seems to hold true. *Sphagnum papillosum,* the species best adapted to surgical requirements, is most widely distributed and most luxuriantly developed eastward; but it is further important to note that in its local distribution surgical sphagnum is by no means confined to the raised bogs. Quite the contrary. Good material is frequently found, indeed in considerable quantities, on the raised bogs, but here it is largely restricted to the margins of small ponds and to wet depressions and is scarce on the drier areas which comprise the greater part of the bog surface. The vast bulk of the sphagnum which grows on such a bog is worthless from a surgical point of view. Much of the best surgical moss and by far the largest quantities (this is particularly true of *Sphagnum papillosum*) are to be found in the wet, flat, ''floating'' bogs that border lakes and ponds; and these, nearly everywhere in eastern Maine, are of frequent occurrence. It was because of this discovery that more effort was not made to locate and explore the raised bogs. Unfortunately, from the surgical standpoint, the lumberman has brought about the destruction of many of the best areas of surgical sphagnum in eastern Maine. In their natural condition the ''flowage'' swamps, which border so many of the lakes and streams in this region, afford ideal conditions for the development of such moss. But *Sphagnum papillosum* in particular is extremely sensitive to any change in environment, and it has been drowned out over vast areas, in which, without question, it formerly abounded, by the damming of the streams and regulation of the water-flow. Similarly, in the great blueberry district about Cherryfield and Columbia Falls the repeated burning-over of the country in the interest of the blueberry crop has had a disastrous effect on the sphagnum.

---

[9] *Op. cit.*

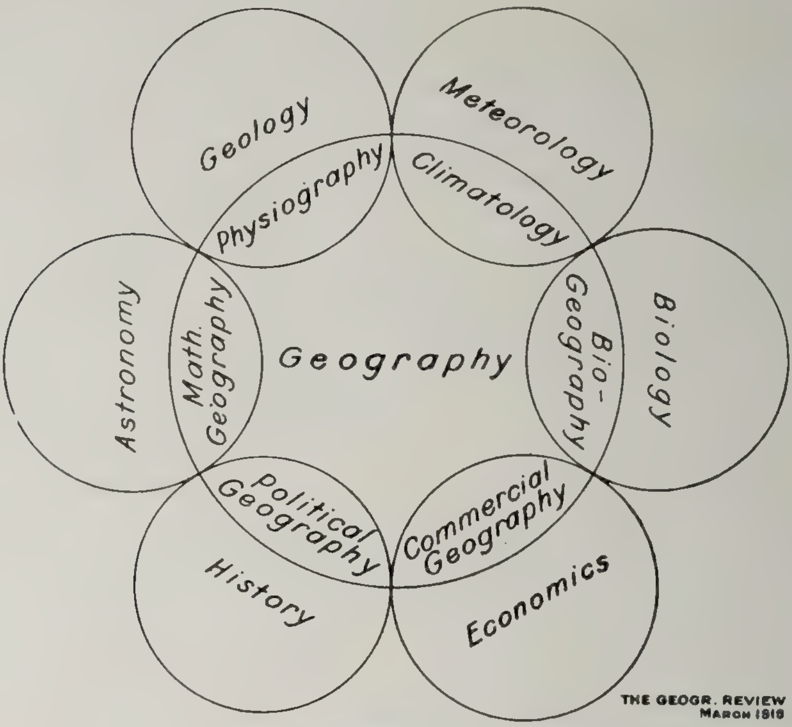
[10] Work cited in footnote 6.

Distinction between ''Moss Bog'' and ''Heath'' by Bastin and Davis

In conclusion, the writer cannot refrain from one other criticism of the Bastin and Davis peat report. In describing the various bogs and swamps the authors attempt to depict the character of the surface vegetation. Of particular significance in the writer's search for supplies of surgical sphagnum appeared to be the seemingly sharp distinction which they made between ''moss bog'' and ''heath.'' Such a distinction, if accurately drawn, would have proved of the utmost assistance; for while a true moss bog is quite apt to contain surgical moss in quantity, a heath is equally apt to contain none at all. Experience soon showed that the distinction implied by Bastin and Davis in reality signified nothing, the ''moss bogs'' in all cases examined proving to be in no wise different from what elsewhere was more correctly described as heath. It may be suggested that, in general, a somewhat more accurate characterization of the botanical aspects of bogs on the part of peat investigators would add considerably to the scientific value of their work.

THE CIRCUMFERENCE OF GEOGRAPHY*

By NEVIN M. FENNEMAN
University of Cincinnati



THE GEOGR. REVIEW
MARCH 1919

FIG. 1—This diagram expresses the fundamental conception that sciences overlap and that each one of the specialized phases of geography belongs equally to some other science. Such a diagram will be helpful if not construed too strictly. In a loose way the central residual part of the circle may represent regional geography. The diagram fails to show that physiography, climatology, etc., enter into regional geography by being treated with respect to their distribution instead of with respect to system and type. The number of overlapping sciences may be made greater or less according to the purpose in hand. [Cf. with the similar diagram in H. R. Mill's "The Realm of Nature" showing the relation of physiography to the sciences upon which it is dependent.—EDIT. NOTE.]

It is a peculiarity of geography to be always discussing and debating its own content—as though a society were to be organized for the sole purpose of finding out what the organization was for. This is not said by way of criticism; indeed this very paper is a continuation of the same discussion. The situation is, however, unique and can scarcely fail to be remarked by on-lookers from other sciences, who have no such doubts as to what their subjects are about.

The basis of this constant concern is not greed but *fear*. Geography wages no aggressive wars and seems to covet no new territory. In certain quarters it bristles with defense; but it is mainly concerned with purging its own house rather than spreading its borders. To rule out "what is not ography" would seem from the discussions to be much more important an to find and claim geography where it has been passing under other ames. The constant apprehension is that by admitting alien subjects we all sooner or later be absorbed by a foreign power and lose our identity.

---

* Presidential address at the fourteenth annual meeting of the Association of American Geographers, Baltimore, December 27 and 28, 1918.

It is probably unnecessary to point out that this is purely an American titude. Geography of the European brand has no such concern for its vn purity or fear of being absorbed. Scholarly geographic treatises from urope may contain long lists of botanical names, or geological descripons, or chapters which might be transferred bodily to monographs on onomics or history.

To many American geographers this would seem like betraying their ause and selling their birthright. There is an implied dread that if geogaphy accepts the work and uses the language of other sciences, geography self will be dismembered and its remains be divided among its competitors. t is worth while to consider this possibility, and a rough plan is here ubmitted for a partition of geography's domain.

Suppose geography were dead, what would be left?

Proposed Partition of Geography's Domain

Geology might easily take over topography, including its genetic treatent, which is physiography—in fact, has never given it up. So also otany has never relinquished plant geography and ecology. Zoölogy does ot forget the distribution of animals. Agriculture is now so specialized nd so firmly entrenched that crops and their distribution, and their relaion to all manner of factors, are studied without concern for geography. eteorology has official standing in all civilized countries and could take are of climatology if geography were bankrupt. Moreover, meteorology s commercially employed and so has the satisfaction of being good for omething beside being merely good "to teach." So it is not afflicted with eart searchings regarding its own content. Mining is abundantly treated y geology and economics. The geographer only borrows from these, mooths out their details, and relates their results to something else. So conomics deals with all other industries and with commerce, sometimes vailing itself of the aid of chemistry and other sciences and always paying ts respects to engineering.

A good part of what is termed political geography is covered also by istory, and history would be more rational if it included still more. Political science, ethnography, etc., cultivate other parts of the geographial field and do it more exhaustively than does geography. Mathematical eography is, of course, pure astronomy, except for cartography, which s straight mathematics.

Thus it seems that, with geography dead, all its tangible effects would be claimed by relatives and the estate could be settled up. To say the least, this is disconcerting. The case is not made better by the reflection that a large number of educated persons would see no reason for objec ing to such a solution, provided only that geography were preserved fo children up to the age when serious study should begin.

Dependence of Geography on Other Sciences for Its Material

At this point, while geography is confessing its limitations, it may a well be owned that, outside the field of exploration, the geographer i mainly dependent on others for his data. Aside from mere location, direc tion, and distance, almost every fact that he employs belongs quite a much to some other science. In so far as that fact represents a class, th entire class of facts is much more apt to be known exhaustively by th other science than by geography. If the geographer speaks of soils, th agriculturist knows more; if he speaks of mines, the geologist knows more if the reference be to manufacturing, the economist's knowledge is mor thorough, or at least more exhaustive; if the subject is the people, th ethnographer, sociologist, or economist has first-hand knowledge, and th geographer is generally a borrower; and so through the list. With respec to all these data someone else is the original student, the "authority," an the geographer is merely "informed." How often is a geographer calle in as an expert, and in what lines? This question is not intended t suggest a wholly negative answer, especially in view of the fact that three of our members are at present in Paris on the staff of the Peac Commission and nearly one-half of our members have been engaged i some expert capacity during the war. It does not follow, of course, that all these were engaged as geographers.

Concession has here been made freely because scholars outside of geography know these facts to be true, and there is nothing to be gained by claiming more than we can defend. If geography is not worth while despite these admissions, its business may as well be wound up.

Need of a Synthetic Areal Science

Reverting now to our former figure of speech, what has geography to say of its proposed demise, the division of its tangible effects and the settling of the estate? The obvious question arises: Would the decedent stay dead? If he were to come to life again, the situation would be embarrassing as between him and his relatives. Assuming that after his decease each of the branches named above as contributing to geography does its task well with respect to Russia, for instance, is there any likelihood that a craving would arise for a synthetic picture of the whole or a critical study of inter-relations? If so, who would satisfy this craving, and who could paint the picture, and what would be its value or standing among scholars?

To begin with, the first question answers itself. There is not one chance in a hundred that ten years would go by without a conscious craving, and n attempt to meet the craving, for a comprehensive view of the areal unit; nd not one chance in a million that a century would elapse before such n interest would be the center of a new science. It matters no whit that ll concrete data are already organized into other sciences, each more xhaustive and more critical with respect to its own data than the new science; it is absolutely certain that interest in the areal unit as such would clothe itself in appropriate form. It is the *areal relation,* after all, hat makes geography.

To dwell on the kind of picture to be painted is not within our present purpose. In part it is a mere assembling of facts from diverse fields, facts joined together by the sole bond of a common locality. Whether we deride or apologize for this aggregation of facts, call it mere description, mere compilation, mere this or mere that (whatever it is, it is always "mere"), this humble task must still be performed before higher work is possible. Description bears the same relation to geography that narration does to history. There can be no sound philosophy in either, based on faulty narration or description.

But data thus assembled from diverse fields do not remain inert. They react on each other like chemicals to produce new compounds, that is, new truths. If the geographer knows less about soils and crops than the agriculturist, less of climate than the meteorologist, less of industry than the economist, less of society than the sociologist, he should still be supreme in this field of secondary compounds which cannot be formed by those who handle the data of one science only.

Value of "Scientific Trespass"

This point needs no elaboration here, but it is worth while recalling a passage from the presidential address of Dr. G. K. Gilbert before this association in this same city ten years ago. In explaining his choice of a subject, he announced himself as an advocate of the principle of "scientific trespass." "The specialist who forever stays at home and digs and delves within his private enclosure has all the advantages of intensive cultivation—except one; and the thing he misses is *cross-fertilization.* Trespass is one of the ways of securing cross-fertilization for his own crops, and of carrying cross-fertilization to the paddock he invades."[1] Gilbert might have added that the geographer is, or should be, the great insect that carries pollen from field to field.

It is not intended here to concede that geography does not concern itself at all in the first-hand search for data. Geographers have, for example, done much for topography. Light on land forms has been by far the leading contribution of American geography (though it is a question whether anyone has contributed to this subject who was not first trained as a geologist).

---

[1] *Science*, Vol. 29, p. 122.

REGIONAL GEOGRAPHY THE CORE OF THE SCIENCE

Since geography *is to be,* it is quite right that physiography and climatology and the study of natural resources and even ecology should be of its family and bear its name, but the point here urged is that these are not the things which make geography *necessary* and *inevitable.* They may be necessary to it, but it is not necessary to them. All these might live with geography dead. All these and others belong to the regions of overlap, or ground common both to geography and to some other science, and, having two parents, would not be totally orphaned if one died; but the study of areas as before described belongs solely to geography and is, moreover, an only child. If these figures are somewhat mixed, it may be well to add in plain English that the one thing that is first, last, and always geography and nothing else, is the study of areas in their compositeness or complexity, that is *regional geography.*

It is not to be implied for one brief moment that physiography and the other branches named are not geography. They all become so when directed toward a geographic purpose. But without the touchstone of areal studies, there is nothing to make physiography other than geology, ecology other than botany, the study of natural resources other than economics.

There is, then, in geography this central core which is pure geography and nothing else, but there is much beyond this core which is none the less geography, though it belongs also to overlapping sciences. Here belong physiography and climatology, mathematical and commercial geography. Still, *the seeds are in the core, and the core is regional geography,* and this is why the subject propagates itself and maintains a separate existence. Without regional geography there is no reason why geography should be treated as a separate branch.

This emphasis on areal relations instead of on the ''elements'' which enter into such relations is, of course, not new. It comes to much the same thing in practice as Ritter's ''home of man'' or Davis's ''physical element and human element'' or this and that man's ''responses'' or Keltie's ''science of distributions'' or Hettner's ''*dingliche Erfüllung der Erdräume*'' (material filling of the earth's surface). Nor is it necessary, for the purpose here in hand, to point out that every element (topography, vegetation, climate, etc.) can be treated with reference to its distribution as well as with reference to its types. Such a treatment belongs to regional geography. It should, however, be noted that the study of the distribution of any one element by itself falls somewhat short of that *distinctive* geographic flavor which comes only when the various elements are studied in their inter-relations.

CULTIVATION OF THE CENTRAL THEME OF GEOGRAPHY AS A SAFEGUARD AGAINST ABSORPTION BY OTHER SCIENCES

Let us now go back to the fear above alluded to, that our subject is going to be swallowed by something else. Why this constant dread? The situation at once suggests that we live too much on our borders and not enough in the center. If we dwell mainly in systematic physiography, why should not geology claim us as a vassal? If we live largely in commercial geography, we are in similar danger from economics; and why should it not be so? We can go round the circle with the same logic. A narrowly political geography of boundaries and capitals never had any reason for a separate existence apart from history.

If we are concerned for our independent existence no amount of fortifying our border will take the place of developing our domain. What we need is more and better studies of regions in their entirety, their compositeness, their complexity, their inter-relations of physical, economic, racial, historic, and other factors. No other science can swallow that and live.

Unnecessary Discrimination Against Geologic Terms

An illustration of warring on the border instead of farming our domain is found in our curious boycott of terms from other sciences even when needed to make the truth clear. It is not permissible to say that the Cumberland Plateau is co-extensive with the strong "Carboniferous" rock (even where that is true) or that the High Plains (of Nebraska and Wyoming) end at the north with certain late "Tertiary" formations. It is permissible to say that the Cumberland Plateau is as broad as certain "resistant" rocks, but a term which would enable us to locate those rocks on the geologic map is taboo. True, the plateau border can be made out on very large-scale and awkward-to-handle topographic maps, but such maps at best are empirical, while the geologic map is interpretative. Since when has geography become so reactionary? Why must we secrete the geologic map as medieval priests secreted the Bible?

In the debates concerning this point there has been the most curious oversight of common usage. "Carboniferous" and its like are dubbed "geologic time names." Such they are indeed, sometimes, just as "Carboniferous" might be the name of a man or a horse or a brand of shoe polish—all as irrelevant as geologic time—but the term also designates a body of material (in this case a system of strata) and, more important still, on the geologic map it stands for an *area*. "Triassic" indeed connotes geologic time, but the same word designates certain areas on the geologic map of the eastern United States. "Portage" is not only a Devonian epoch but a belt on the geologic map of western New York, a belt that must be spoken of and cannot be designated with equal clearness under any other name. In this manner, much use is properly made of geologic terms, not because they are names of epochs but because they are names of areas that force themselves on our notice by certain peculiarities, thus leading to rational explanations. For three-fourths of the United States the geologic map is beyond comparison the one most valuable map for interpreting topographic contrasts between adjacent areas. Why must the words printed on it be classed as dangerous? The answer is: Geography is in danger of being swallowed, and self-preservation is nature first law.

But "Cumberland Plateau" is a geographic term. How can the geologist say with impunity that the Carboniferous rocks are co-extensive wit the Cumberland Plateau? Is not the danger mutual? Is his science no in danger of being swallowed by geography? The answer is: He is no afraid on that borderland where sciences overlap, because his own peculia domain, which is not overlapped by geography or anything else, is too larg and too well cultivated to admit of such fears. Our own safety lies in th same policy.

In our efforts toward self-preservation through purity, we have classe scientific terms as clean and unclean. The latter, such as Archean, Mesozoic, etc., cannot be touched without defilement. So we have built up a whole ceremonial by which we hope to be saved; but not so is salvation found. Its price to geography is no less than the diligent cultivating of its own peculiar field, the doing of something which the world needs and which no other science can do.

Animals have more than one way of evading the jaws of their competitors. The turtle is encased and puts up a good defense but is weak on the offensive. It is the same with the oyster. Others, like the squash bug, owe their safety to a peculiar flavor or odor. Still others specialize in modes of escape. But all such special provision belongs to the weak rather than to the strong. If geography will cultivate its own strength like the large mammals, it will not be necessary for it to encase itself like the oyster or cultivate the peculiar flavor of the squash bug to avoid being eaten.

In so far as there are frontiers between the sciences, let us have them ungarrisoned and let us have free trade. Let there be among sciences the same struggle for existence and law of survival that Darwin found among species. Then every field of study that answers to an intellectual need will have due recognition.

THE SEVERAL SCIENCES DESIGNATED BY THEIR CENTERS, NOT BY THEIR CIRCUMFERENCES

The subject announced for this brief address was "The Circumference of Geography." Presumably enough has been said to show that a science cannot be defined by its circumference. We may designate the center, and that should be enough. Everyone knows what botany is so long as we stay near the center, but where is its farthest limit? Far out in chemistry and medicine and geology, to say the least. And where is the limit of chemistry? Nowhere. Yet chemistry is not hard to define if it be designated by its center instead of by trying to draw its circumference. So the center of geography is the study of *areas*, generally, of course, in relation to man, for human habitation affords the most frequent utilitarian son for such study and is also the center of the greatest intellectual erest; but the comprehensive study of an uninhabitable region would ll be geography.

It is not only the right but the duty of every science to develop all rts of its domain, but it is none the less true of all, as of geography, at their right to separate existence depends on their cultivation of that rt of their field which is not overlapped by others. Let there be no sunderstanding; there is no intention of assigning more dignity to one rt of the field than to another or of asking any man to turn aside from at which interests him to something else. There is no more inherent rth in a center than in a border. But some of us have a philosophic terest in viewing relationships, and in asking why the whole range of owledge has grouped itself around certain centers, and what it is that eps those centers, which have received names, somewhat permanent, and at the advantage is in grouping knowledge around one center rather an another.

Moreover, all of us have a very practical interest in seeing that our n work should not suffer by isolation. We all want our own work to ve the advantage of connections, and it is greatly to our interest that mebody should cultivate certain central fields even though most of us rk on the borders. The logic of events, if no other logic, has brought gether in this association a group of men of rather diverse interests. e are disposed to think that this is not a mere chance but that something ndamental underlies our union. Much that interests the individual does t concern the whole; but we feel more or less intelligently that there is ofit in this intercourse and we want the relation to be closer. If there a class of studies that will make our separate fields more important and ore interesting to others and enable us to profit more by our association, e want to know what that class is and to encourage it.

Beside those who are, first and last, geographers, our association conins geologists, topographers, geodesists, meteorologists, ecologists, zoölosts, geophysicists, historians, and economists. The list is not intended to complete. We have joined ourselves together evidently expecting to nd a common interest. Where is the common ground on which such iversity can meet? Interest in places, areas, regions is the common bond.

This quasi-philosophical study of relationships is therefore important those whose privilege it is to direct research or to organize education. men in such position decide with eyes open that physiography and mmercial geography and anthropogeography and the rest should not be erely geology, economics, ethnography, etc., they must act accordingly. he character of these subjects can not be controlled by ceremonial law. he effective way is to set in the midst of them a great light, the light hich comes alone from the comprehensive, rational, systematic study of egions.

THE YOUNG COASTS OF ANNAM AND NORTHERN SPAIN*

By W. M. DAVIS

The Coast of Annam

An explanatory account of the coast of northern French Indo-China with many illustrations of its influence on human conditions, is given in a recent interesting article in *La Géographie.*[1] The leading features are as follows: The mountainous border of the Gulf of Tonkin has for the most part an embayed shore line of subrecent or recent submergence, fronted by a shallow sea bottom, which may be inferred to represent a submerged piedmont fluviatile plain composed of detritus from the well-dissected backland: but the coast of Annam to the south of the great delta of the Song-koi, or Red River, is now simplified from the initial irregularity due to its subrecent submergence by two series of longshore beaches, one emerged to a height of three or four meters and composed largely of shells the other at sea level and of a more sandy composition. Both series of beaches stretch in long curves, concave seaward, between salient spurs or hills that advance from the mountainous backland as headlands or islands. The salients are a little wave-cut at the level of the beaches. The lower beaches are in groups of two or three members at the same level, one prograded in front of the other; the outermost beach appears to be still growing seaward. The upper beaches are not so well developed as the lower ones, presumably because they were formed on the uneven sea bottom of first submergence, while the lower beaches had better opportunity for growth, as they were formed on the off-shore sediments of the upper beaches.

The former lagoon floors behind the higher beaches now appear as low plains, which may be inferred to extend inland into the bays and coves of the initial shore line of submergence, at the heads of which delta plains should stand at the same altitude as that of the emerged beaches. The low plains are drained by wandering rivers on their way from the mountains to the sea; the rivers are presumably entrenched in the former bay-head delta plains. The lower beaches enclose marshy lagoons. In striking contrast to the simplified coast of Annam, the coast of Tonkin, north of the great delta of the Red River, is still intricately embayed; the contrast is explained by assuming a recent and gentle tilting of the land on an axis trending northwest-southeast through the delta, whereby the earlier and greater submergence of the whole coast is continued and slightly increased to the northeast but is reversed into a slight emergence to the southwest.

---

* A continuation of the series "Notes on the Description of Land Forms" which appeared in the *Bull. Amer. Geogr. Soc.* as follows: Vol. 42, 1910, pp. 671-675, 840-844; Vol. 43, 1911, pp. 46-51, 190-194, 598-604 679-684, 847-853; Vol. 44, 1912, pp. 908-913; Vol. 45, 1913, pp. 360-364, 518-521; Vol. 46, 1914, pp. 36-42, 524-527.

[1] E. Chassigneux: Plages soulevées dans le nord de l'Annam, *La Géographie*, Vol. 32, 1918, pp. 81-95.

How the Inhabitants Live

The natives of northern Annam occupy by tradition and therefore by preference the lower beaches and the marshy lagoons, where their villages are surrounded by hedges of bamboo; the marshes are cultivated in rice fields. Where the upper beaches are occupied, the dryness of their shell-bank soil, in which bamboo will not grow, leads to the use of reeds and thorny bushes for village hedges; here the rice fields of the marshy lagoons are replaced by plantations of mulberry trees, the leaves of which serve as food for silk worms. Wells on the elevated beaches take the place of tanks and pools in the lower marshes; the cemented shell stone, quarried from a small depth, is used for houses and pagodas. The mountainous backland is thinly populated.

Desirability of Presenting General Features First in a Regional Description

The article from which the above abstract is made deserves praise because it enables the reader to visualize the landscape that it describes and to understand how the inhabitants live upon it. But the reader's task would have been easier if certain details, added above as inferences, had been explicitly announced. The reader's task would have been still more facilitated if the larger features of the region, which are placed first in the abstract, had not been postponed to the last pages of the article; for in that case the detailed accounts of the raised beaches which occupy the first pages of the article, where they stand unrelated to their natural attachments, could have been described after the larger features of the landscape to which they are manifestly subordinate. It is true that, to an observer on the ground, the elevated beaches may, for one reason or another, take precedence of other, larger features, particularly if they are selected as objects of special study and if shells are collected from them with the result of discovering that the species there preserved are the same as those still living in the neighboring sea, as is here the case; but when it comes to presenting the geographical results of such a study to readers at a distance, much may be said in favor of describing the general features of the region first, so that when the details are presented they may fall into their properly subordinate position, however great their importance may have seemed in a near-by view.

Absence of Coral Reefs

It is singular that the headlands and islands of this torrid coast of submergence have not been fringed with coral reefs. The reason for the absence of reefs may probably be found in the shallowness of the adjoining sea floor, from which, as in the shallow Java Sea farther south, the sediments are swept landward to aid in the formation of beaches between the headlands, thus making the headland waters prevailingly turbid; for corals will not thrive where sediments are swept about.

The Bay of Santander

A recent article in the geological series of the *Trabajos del Museo Nacional de Ciencias Naturales* of Madrid,[2] like other articles in the same series, bears many marks of an awakening to modern morphological methods, which Spanish geographers have long disregarded. The Bay of Santander, one of several re-entrants on the northern, or Cantabrian, coast of Spain, is here analytically examined as to the geological history of its origin; the conclusions are set forth in such a manner that a concise explanatory account of the district may be composed from them. Although the author does not take this final geographical step, he might easily have done so if his object had not been gained without it, for he shows abundant familiarity with good physiographic procedure. His results may be summarized as follows:

The Cantabrian coast, composed of folded sandstones and limestones with east-west trends, slopes from a mountainous backland to a piedmont bench, 10 or 15 kilometers in width and 60 or 70 meters in altitude, which is interpreted as a platform of marine abrasion that was cut while the region stood at a lower level than now. Emergence then placed the platform at a greater altitude than it has at present, whereupon it was maturely dissected, so that, while a general view shows the residual uplands lying at accordant levels, many branching valleys are widely opened and the inter-valley hills have well-rounded slopes. A submergence then occurred, whereby the sea gained access to the maturely branching valleys and converted them into *rias,* or branching bays, some of which reached almost as far inland as the mountains; but this was so long ago that the inner branches of the bays are now largely filled with alluvium and converted into delta plains and tidal marshes, while the outer bays are shoaled and their shores are somewhat cliffed, leaving little valleys suspended above the present beaches. The process of *ria* filling is thought to have been aided by a slight emergence hereabouts, in contrast to which a continued submergence has prevented a corresponding aggradation of the larger *rias* in the Galician coast, farther west.

Desirability of Additional Information

Further information is desirable regarding certain items. First, the form of the spur ends where the mountains of the backland join the uplands of the piedmont bench should be examined; for if the bench be truly a platform of marine abrasion, cut back to a width of 10 or 15 kilometers, the steepened ends of the spurs ought to stand in line as parts of the series of cliffs that must have risen from the maturely retrograded inner border of the platform: but if the upland be a dissected peneplain, the spurs ought to decline gradually and their ends should not stand in line. Second, the possible occurrence of marine gravels on the least dissected inter-valley uplands should be searched for. Third, the relation of the valleys to the truncated strata needs consideration; for if the uplands truly represent a platform of abrasion, then the rivers which took possession of the presumably gravel-covered platform when it emerged would have incised their superposed courses without regard to the underlying hard and soft beds; while if the dissected upland be an uplifted peneplain, the valleys should show a considerable measure of adjustment to longitudinal weak belts. Fourth, the pattern of the outer coast, regarding which little is said, merits some attention; for, although the occurrence of low cliffs in the bays suggests the occurrence of higher cliffs on the outer coast, nothing is said about them.

---

[2] J. Dantín Cereceda: Evolución morfológica de la Bahía de Santander, *Trab. del. Museo Nacl. d Cienc. Nat.: Ser. Geol. No. 20,* Madrid, 1917.

Geographical Instead of Geological Form of Presentation

The results presented in this morphogenetic inquiry are set forth in historical order, in which the past tense of verbs, reproduced in the above abstract, is characteristically used. The results might be easily translated into geographical form in which the present tense is preferable, as follows: Santander lies on an outer bay-shore of a largely aggraded *ria,* which, like its neighbors, occupies a partly submerged valley system in an uplifted and maturely dissected platform of marine abrasion, 10 or 15 kilometers in width and 60 or 70 meters in altitude, at the base of the Cantabrian Mountains of northern Spain. Or: A belt of deformed sandstones and limestones, which rises in most of its width to form the Cantabrian Mountains of northern Spain, is continued along its seaward border in an uplifted and maturely dissected platform of marine abrasion, 10 or 15 kilometers in width and 60 or 70 meters in altitude, the valleys in which are occupied by branching *rias,* largely aggraded in their inner parts and somewhat shoaled by deposition and widened by cliffing in their outer parts: on the northern side of an outer bay in one of the *rias,* which opens northeastward and is imperfectly filled with alluvium, lies Santander.

As in all condensed explanatory descriptions, the qualitative statements regarding the Annam and Cantabrian coasts, given above, should be supplemented by detailed quantitative statements, in order to bring the local facts clearly before the reader: but the quantitative details are best apprehended by a mature reader if they are introduced by a concise qualitative summary.

The Maturity of Coasts

The partly submerged coasts described in both of the articles above reviewed are stated by the authors to be in the stage of "maturity." It s gratifying to perceive in the use of this term that the systematic evolution of coasts, during which they pass through a well-defined succession of forms in orderly sequence, is recognized as of value in physiographic description; but it is questionable whether ''maturity'' is the best term by which to designate the stage of evolution reached by the coasts in question. An embayed coast must, if it stand still through an entire cycle of marine abrasion, very soon reach the stage of slight headland cliffing and partial bay filling; it must somewhat later reach the stage of complete headland truncation, when the steep cliffs, usually of increasing height, are cut back nearly or quite as far as the initial bay heads; and it will at a much later time reach the stage of far-retrograded, slanting cliffs of moderate height, when the slowly retreating shore line has receded well into the original interior highlands, which will then have lost a good share of their initial height by general degradation. A complete cycle of marine abrasion may thus be divided into early, advanced, and late, or young, mature, and old stages of evolution; and it is in this way that the marine cycle has been divided by those who have introduced organic terms for its description. In accordance with this scheme of nomenclature, the present stage of the Annam and Cantabrian coasts should be described as ''young.''

Whether a scheme of nomenclature which is based upon terms of organic growth shall be adopted for the description of inorganic land forms is perhaps still an open question; but until some other scheme is announced. it is desirable that authors who characterize slightly modified coasts of submergence as ''mature'' should give notice that they are departing from the meaning which has heretofore been given to ''maturity'' in the description of coastal forms and should at the same time define the other stages of coastal evolution which they propose to designate as ''young'' and ''old.'

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Meetings of February. An inter-monthly meeting of the American Geographical Society was held on Tuesday evening, February 11, at the Engineering Societies' Building, 29 West Thirty-ninth Street. President Greenough presided. The lecturer of the evening was Mr. Henry Woodhouse of the Aero Club of America; he addressed the Society on "The Trail of the Airplane." The lecture dealt with the function of the airplane in exploration and in commerce as well as in war and was illustrated by motion pictures of exceptional merit. In addition to the article on the use of the airplane in exploration in the present number of the *Geographical Review*, Mr. Woodhouse contributed an article on aërial transportation, it will be recalled, over a year ago (Aëronautical Maps and Aërial Transportation, Vol. 4, 1917, pp. 329-350).

A monthly meeting of the Society was held on February 25. President Greenough presided. He submitted the names of 13 candidates for Fellowship, each of whom had been approved by the Council, and they were confirmed as Fellows of the Society. Thereupon Dr. Alfred G. Mayor, director of the Department of Marine Biology of the Carnegie Institution, addressed the Society on "The South Sea Islands." In his lecture he drew upon the experiences of his various zoölogical trips to the Pacific—to the Fiji Islands in 1897, on the *Albatross* in 1899-1900, to Torres Straits and New Guinea in 1913, and to Samoa in 1917.

NORTH AMERICA

The War Work of the United States Geological Survey. Summaries of the services rendered by science in the conduct of the war (see G. K. Burgess: Application of Science to Warfare in France, *Scientific Monthly*, October, 1917, pp. 289-297, and J. S. Ames: Science at the Front, *Atlantic Monthly*, January, 1918, pp. 90-100), make it evident that of all branches few have been of greater importance than the so-called earth sciences. While it is an every-day observation that geography has come into its own more fully than ever before, it is clear, too, that geology, also, has demonstrated its practical utility in a new and striking manner. In a series of "discussions" appearing in *Economic Geology* (March, 1918, pp. 145-146; June, 1918, pp. 314-315; and July, 1918, pp. 392-399) the important co-operation of the United States Geological Survey in government war work is dealt with. A note in the *Geographical Review* (Vol. 5, 1918, p. 73) has already called attention to some phases of this contribution, but the Thirty-Ninth Annual Report (for the fiscal year ended June 30, 1918) of the Survey itself, recently issued (163 pp.; Washington, D. C., 1918), contains a comprehensive statement of the signally valuable service rendered.

Immediately upon this country's entry into the conflict each branch of the organization directed its activities, so far as possible, to assisting in the prosecution of the war. The list of their multitudinous achievements makes a notable record. The Geological Branch began an exhaustive investigation into the mineral resources of the nation, instituting a painstaking search for new deposits, particularly of those materials needed to supply military demands. This search was not limited to the territory of the United States, but was carried on in other parts of the continent and the West Indies from which essential minerals might be obtained. To supplement this work a compilation of statistics regarding the mineral resources of the world was undertaken. The results of these researches have been partially published, in the press and in the various monographs issued by the Survey during the year. In addition to their importance as war work, they will form, when completed, a valuable contribution to pure science.

In order to ascertain the extent to which electricity might be substituted for coal and other fuels, the Water Supply Branch instituted a country-wide survey of the water power available. This survey is still going on. Its completion should mark a most notable advance toward the development of the hydro-electric resources of the nation, bringing the United States into line with the many other countries that are making a systematic effort to utilize their long-neglected water power. This division also contributed toward a thorough investigation of water supplies for training camps, their drainage and sanitation, their protection from floods, and the springs available for army use in the desert regions.

In the Topographic Branch, though its force was severely drawn upon for oversea service, extensive work was carried on in military mapping. Camp sites were surveyed, aviation fields laid out, locations for munition plants selected, artillery ranges plotted, while motor truck routes and airplane courses were mapped in many parts of the country. In addition to the regular topographic work, which in the fiscal year ended June 30, 1918, added 21,955 square miles to the area so surveyed, bringing the percentage of the total area of the country mapped to 42.2, special military mapping of regions selected by the War Department, mostly along the borders of the United States, covered 22,579 square miles.

To illustrate the war work carried on by the Survey detailed graphs are published in the report referred to. These diagrams reveal the fact that nearly every department of the government and many of the subordinate bureaus, boards, divisions, commissions, and administrations were served in some important capacity by the war-time activities of the Geological Survey.

Free-Air Data and the Cold Winter of 1917-18. The development of aviation for commercial purposes will inevitably lead to a more extended investigation of the meteorological conditions of the free air, as well as to the more detailed study of the data which are already available. Both meteorology and aviation will profit by this increasing emphasis upon what is, in many respects, the most important aspect of the science of the atmosphere, viz. that which concerns the conditions above the surface up to the highest flying levels and beyond. In eight *Supplements* to the *Monthly Weather Review* (Nos. 3, 5, 7, 8, 10, 11, 12, 13), the data obtained at the Drexel (Nebr.) Aerological Station, at Fort Omaha (Nebr.), and at the Ellendale (No. Dak.) Aerological Station have been published in full and discussed.

The two most recent *Supplements*, Nos. 12 and 13 (1918), contain the data obtained at Drexel and Ellendale from January to June, 1918, which are discussed by Willis R. Gregg; a description of the Ellendale station and notes on kite-flying by V. E. Jakl, and a study of the free-air temperatures during the cold winter of 1917-18 by Willis R. Gregg. The last-named discussion, while it rests upon incomplete data, brings out some facts of general meteorological interest. It is suggested that the cause of the remarkable temperature abnormalities that prevailed during the winter of 1917-18 is to be sought in the movements of the high- and low-pressure areas across the country and in the resulting location of the mean barometric maxima and minima. The pressure distribution in December, 1917, showed a continental anticyclone stretching from North Dakota southeastward to Illinois and a region of low pressure over the extreme Northwest. This pressure distribution favored low temperatures in the East and high temperatures over Western sections.

In January, 1918, also, the mean pressure distribution was similar, as were the temperature abnormalities. The pressure was, however, higher over Oregon and northern California, and this to some extent neutralized the influence of the high on the eastern slope of the Rocky Mountains. Hence the temperatures over the Northwest were not much above the average. In general, the southward movement of the lows during the winter drew in more cold air than usual from the north, and this resulted in large negative departures.

R. DeC. Ward

SOUTH AMERICA

The Petroleum Resources of South America. Though South America now ranks next to last among the petroleum-producing continents (John D. Northrop: Petroleum in 1916, *Mineral Resources of the United States for 1916*, Part 2, pp. 679-886, U. S. Geol. Survey, Washington, 1918) it seems likely that she will eventually occupy second or third place if the resources of her various fields fulfill present expectations. These deposits have been attracting much attention of late years, partly because of their latent possibilities, partly because, lying outside of the sphere of political domination of the great consuming nations, they afford a more independent source of supply.

Among the most comprehensive and authoritative discussions of the subject is a recent paper by F. G. Clapp entitled "Review of Present Knowledge Regarding the Petroleum Resources of South America" (*Bull. Amer. Inst. Mining Engineers*, No. 130, Oct. 1917, pp. 1739-1791). The author, writing from a wide acquaintance with the literature on the subject, a knowledge of the comparative geology of petroleum fields, and a practical familiarity with the problems of exploitation, presents a systematic treatment of the oil resources of the continent, productive and potential.

Five geological belts of oil-bearing rocks in South America are recognized. The first, the Caribbean, is in many respects a continuation of the Gulf Coastal Plain of North America and includes the areas being studied by petroleum companies in Colombia nd northern Venezuela. Hon. Preston McGoodwin, in *Commerce Reports* for October 7, 916, describes in detail the status of oil development in the latter republic at that date. or notes on the more recent developments in these countries see *Commerce Reports*, uly 3, 1918, p. 36, and July 25, 1918, p. 329.

The second belt, lying between the Andes and the Pacific, corresponds to the similarly ituated oil regions of North America. In this belt are located the already productive ields of Peru, at Zorritos, Lobitos, and Negritos. This is still the leading oil region f South America, having produced, in 1917, 2,533,417 barrels (see *U. S. Geol. Survey ress Bull. No. 382,* Sept. 1918). More than half of Peru's production comes from he Negritos pool.

The third belt is situated about the Orinoco delta, where asphalt lakes, supposed to ndicate the presence of large underlying petroleum deposits, have been worked for any years, but where little oil development has as yet taken place.

The Andean district, the fourth in the series, extends along the eastern slope of the ordillera, from Colombia to Patagonia. None of these fields are producing in export-ble quantities, but several are considered of great promise, particularly that of the anta Cruz region in eastern Bolivia.

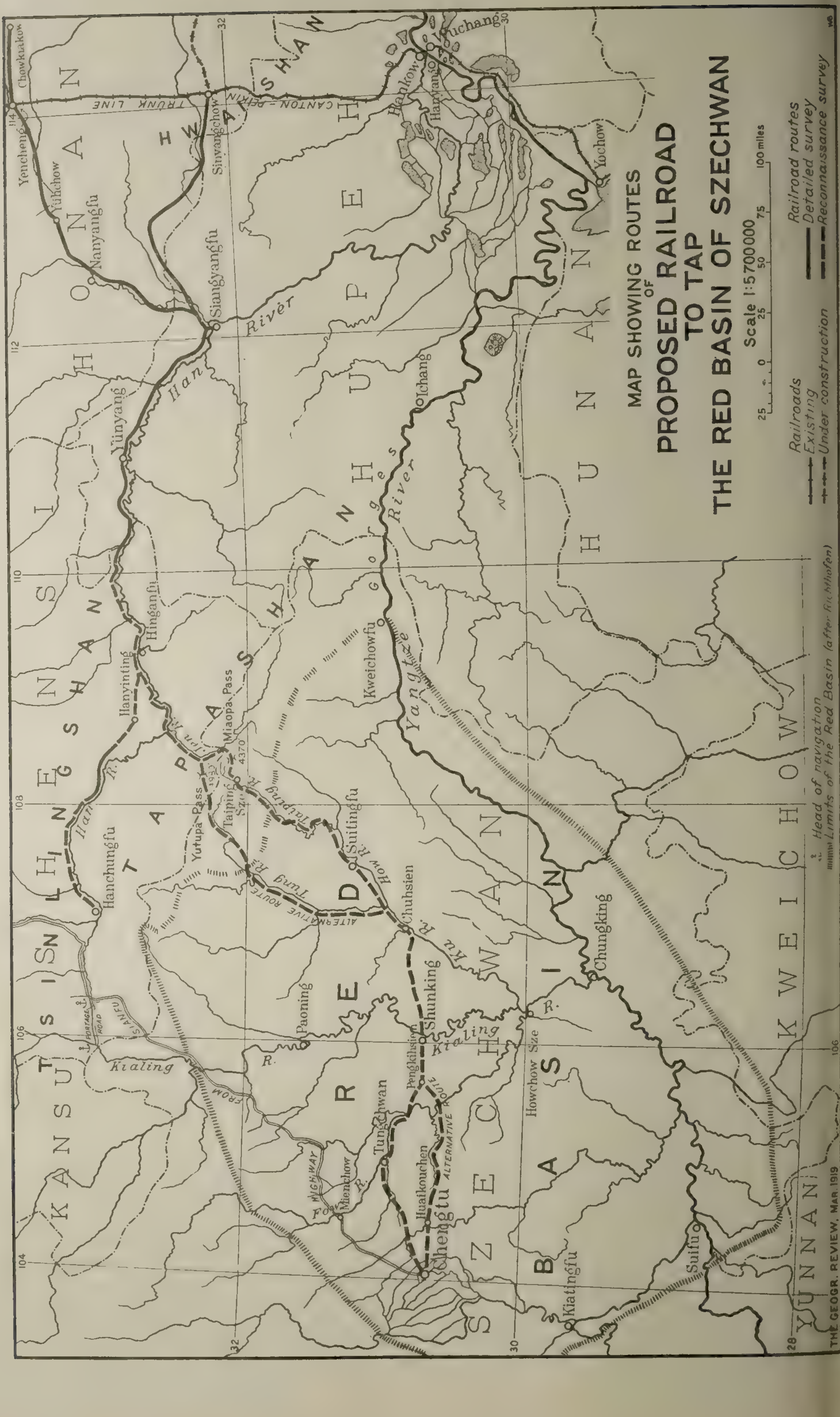
The fifth belt, that of the South Atlantic coastal plain, contains the second field in outh America which is actually producing on a commercial scale. Operations in this eld are described in *Commerce Reports* for June 2, 1917. According to the *Geological urvey Press Bulletin* cited above, the production of petroleum in Argentina during the ear 1917 was 1,144,737 barrels. All of this was yielded by the wells at Comodoro ivadavia, other sources being negligible. The Argentine publication *Revista de conomía y Finanzas* (Sept. 5, 1918) estimates the total production for the year 1918 t 1,272,114 barrels (202,251 cubic meters), thus showing a substantial gain over 1917, f 127,377 barrels. This increase is due to the greater number of wells now in operation. ll of the work done in this field is conducted by the Argentine government. (See lso Fernando de Pedroso: Informe sobre el estado de la exploración y explotación de s yacimientos petrolíferos del distrito minero de Comodoro Rivadavia, *Direcc. Gen. de inas, Geol. e Hidrol. Bol. No. 6, Serie A* (*Minas*), Minist. de Agric., Buenos Aires, 915, and other publications by the same office.)

A large part of South American petroleum is of asphaltic or mixed bases, being articularly suitable for fuel oil. In view of the scarcity and high cost of wood and oal in many of the most densely settled sections of the continent this petroleum supply ill probably become of great importance in furnishing fuel for ships, railways, and ctories.

Reopening of the British Guiana Research Station of the New York Zoolog-al Society. In his introduction to the volume ''Tropical Wild Life in British Guiana'' ee *Geogr. Rev.*, Vol. 6, 1918, p. 460) the late Colonel Roosevelt said: ''The estab-shment of the Tropical Research Station in British Guiana by the New York Zoological ociety marks the beginning of a wholly new type of biological work, capable of literally imitable expansion. It provides for intensive study, in the open field, of the teeming imal life of the tropics.''

Every member of the staff of this station has been serving in the American army ring the war, and, now that hostilities have ceased, an expedition has started for ritish Guiana to resume scientific investigation. The financial support necessary for is undertaking has been provided by the New York Zoological Society through the nerosity of five members of the Board of Managers, Col. Anthony R. Kuser, C. Led-rd Blair, Andrew Carnegie, George J. Gould, and A. Barton Hepburn, and the quisite leave of absence has been granted to the staff in the service of the Society. n February 26 three of the staff sailed for the south: William Beebe, Director; fred Emerson, Research Assistant; and John Tee-Van, Artist and Preparateur. Their tfit included the most complete laboratory equipment ever taken to the tropics, and e station was reopened under most auspicious conditions at Katabo, its permanent adquarters. This is a most beautiful site, shaded with hundred-foot bamboos, at the ry edge of the jungle, and directly at the junction of two great rivers, the Mazaruni d the Cuyuni. Here several bungalows and a large laboratory await occupancy, and re it is hoped that many of our scientific men may find a stimulating field for the osecution of their particular lines of research.

While each member of the staff will undertake some special investigation, yet it is e intention of the Director that all shall unite in some definite ecological study of the errelations of certain groups of organisms, in the hope of gaining some insight into re general problems of evolution, of adaptation, of survival. The results of all the dies will be published by the Zoological Society in the second volume of ''Tropical ild Life.''


MAP SHOWING ROUTES OF PROPOSED RAILROAD TO TAP THE RED BASIN OF SZECHWAN
Scale 1:5700000
25 0 25 50 75 100 miles
Railroads
Existing
Under construction
Railroad routes
Detailed survey
Reconnaissance survey
Head of navigation
Limits of the Red Basin (after Richthofen)
THE GEOGR. REVIEW, MAR. 1919
KANSU
SHENSI
HONAN
HUPEH
HUNAN
SZECHWAN
KWEICHOW
YUNNAN
RED BASIN
TAPA SHAN
HWAI SHAN
TSINLING SHAN
CANTON - PEKING TRUNK LINE
Chowkiakow
Yencheng
Yüchow
Nanyangfu
Sinyangchow
Siangyangfu
Han River
Yünyang
Hinganfu
Hanyinting
Hanchungfu
Han R.
Miaopa Pass
4370
Yutupa Pass
Taiping Sze
Taiping R.
Suitingfu
How R.
Tung R.
ALTERNATIVE ROUTE
Chuhsien
Ku R.
Paoning
Shunking
Kialing R.
Kialing
Penglaihsien
Howchow Size
Tungchwan
Mienchow
Fow R.
HIGHWAY
FROM SIANFU
PORTAGE ROAD
Huaikouchen
ALTERNATIVE ROUTE
Chengtu
Kiatingfu
Suifu
Chungking
Yangtze River
Gorges
Kweichowfu
Ichang
Yochow
Hankow
Hanyang
Wuchang
104
106
108
110
112
114
28
30
32

Three years ago Colonel Theodore Roosevelt visited the station and wrote of its functions and activities. This year Professor Henry Fairfield Osborn, President of the Zoological Society and of the American Museum of Natural History, accompanied the expedition, spent several weeks in observing the unique conditions under which the undertaking is carried on, and advised as to its extension and future.

ASIA

A Proposed Railroad to Tap the Red Basin of Szechwan, China. Proverbial among the productive and populous regions of China is the Red Basin of Szechwan. On its area of 20,000 square miles is concentrated the major part of the vast province's 50,000,000 or 60,000,000 inhabitants. A maximum is reached in the Chengtu plain, where the gently sloping surface permits an intensive development of irrigation; here Richthofen ("Letters, 1870-1872," Shanghai, 2nd edit., 1903) estimated the density at 1,500 per square mile. But elsewhere, too, on the extremely accidented surface cultivation is carried to a high pitch by terracing. Rice, wheat, maize, and bean fields cover the slopes of 30°. Advantage is taken of differential erosion to cultivate parallel strips on slopes of 60°: indeed one may say there is cultivation "where it is possible for a man to stand and work." Hemp, sugar, tobacco, and oranges are among the leading products of the country. The brine wells of the basin are famous; the red rocks are underlain by coal, and the existence of other minerals is known. Yet today the trade of the rich and populous province is small; it is largely confined to salt and such valuable commodities as silk and—formerly—opium. The customs returns from the treaty port of Chungking did not greatly exceed $20,000,000 in 1913 (*Dipl. and Cons. Repts. No. 5378,* London, 1914). Szechwan has no adequate outlet for its wealth.

Richthofen's Red Basin, a plateau of an average elevation of some 1,000 to 2,000 feet, is entirely rimmed by comparatively lofty mountain ranges. On the east the confused mountain mass of the Tapashan, 120 miles broad, separating Szechwan from Hupeh, is forced by the Yangtzekiang; the river, here flowing with strong current and broken by difficult rapids, forms the single gateway to the interior. Dangers of navigation put a toll on trade estimated at an annual loss of 20 per cent of the cargo. Until quite recently a favorable winter journey from Shanghai to Chungking took a month: against the summer floods it might be drawn out to three or four. In 1910, however, a regular steamship service was inaugurated with one vessel plying on the river during the summer months. Since 1914 the service has been extended to a fleet of ten vessels. Their success has been somewhat variable, and steam navigation on the upper Yangtze must still be regarded as in an experimental stage (see: La navigation du Yang-tseu entre Han-k'eou et le Sseu-tch'ouan, *Ann. de Géogr.*, Jan., 1918, p. 73; see also Report on Chungking, *China Maritime Customs Statist. Series Nos. 3 and 4 (Returns of Trade and Trade Repts.)*, 1916, Part 2, Vol. 2, pp. 421-426). Of land highways there are none. A railroad paralleling the Yangtze (Four Power Concession) has been projected, but its construction would be costly and difficult. More feasible is the Chinese Government Railroad plan of entering Szechwan from the north, from the Han River valley. Partial surveys have already been made for a road along this valley that will connect at Sinyangchow on the Pekin-Canton trunk road with the line now under construction from Nanking, with an alternative route connecting with the Pekin line farther north at Yencheng and originating some 36 miles to the east at Chowkiakow, its present eastern terminus. In the west the line leaves the Han River at Hinganfu and proceeds over the Tapashan to Chengtu. A branch has also been surveyed up the Han River from Hinganfu to Hanchungfu, where it reaches the two main routes by which the Red Basin has hitherto been accessible from the east and north: (1) the old historic highway from Sianfu, the capital of Shensi, to Chengtu and (2) the waterway up the Han to the head of navigation (a few miles below its source) across a land portage of 45 miles to the head of navigation on the Kialing and thence down this river to Paoning and Chungking. Various articles on the proposed line have appeared in the *Far Eastern Review* of Shanghai: the route from Chowkiakow to Hanchungfu was described in the February, 1917, number (pp. 321-332, with a railway map of China, 1:7,750,000 [marked 1:6,000,000 on original]) and the eastern section, from Chowkiakow to Siangyangfu, more in detail in the June, 1917, issue (pp. 492-494), while the whole line from Sinyangchow to Chengtu was discussed in the July, 1918, issue (pp. 249-263, with map, 1:5,000,000). The following notes and accompanying map are based on the unpublished reports of reconnaissances made in 1917 by two American engineers under the direction of the Chinese Government.

To enter the Red Basin from the northeast it is necessary to cross the broken, mountainous country of the Tapashan, rising to a general elevation of 6,000 feet and watered by numerous deep-cut streams draining respectively northeast and southwest. The direction and character of the stream valleys and the elevation of the passes are the factors here controlling railroad construction. Careful survey of the block of country between longitudes 108° and 110° E. and latitudes 31°50′ and 32°50′ N. has shown the existence of two passes of comparatively low elevation. From Hinganfu both are approached by the Jen River, the most practicable route leading out of the Han valley. The lower, Miaopa Pass, 4,370 feet, gives access to the Taiping valley; the Yutupa Pass, 4,980 feet, to the twin stream Tungkiang. The two rivers unite some distance above Chuhsien, from which point the projected railway will run in a nearly direct line to Chengtu via the main trail through a populous country. West of Chuhsien villages of 100 to 600 families, interspersed with smaller ones, appear every four or five miles, and on the main river crossings are such important centers as Shunking and Tungchwan. In the western portion an alternative route is under reconnaissance; it would, however, encroach on the Four Power Concession at Huaikouchen. The alternative routes via the Taiping and the Tungkiang valleys differ little in length. The former has the advantage by 15 miles and will require a shorter summit tunnel, but its summit gradients will be steeper (20 miles of 2 per cent gradient against 12 of 1.8 per cent, with possibilities of reduction to 1 per cent via the Yutupa Pass). Coal and iron are known along the Taiping, and the valley includes a few more large centers. Reconnaissance to the west has proved the restricted choice of routes, and not only does this apply to general direction; in detail the line that will be built must closely follow the winding course of the river selected. By the Yutupa Pass there will be a three-mile tunnel, and a three-thousand-foot bridge will be needed to cross the broad river at Shunking; but otherwise no special engineering difficulties are expected.

The line as thus designed will intercept the junk traffic of the chief rivers navigable in varying degree. For four months of the year the Han River is open to 10-ton junks to Hanchungfu, center of a plain rivaling that of Chengtu in fertility and wealth (see the excellent Commercial Report on Shensi Province, *Board of Trade Journ.*, Jan. 31, 1918). Tungchwan and Shunking are reached by 20-ton junks, and by construction of a branch line from the latter town to Chungking a good deal of the Yangtze traffic might be diverted. The branch line required would be 120 miles long and would pass through the important coal-mining center of Howchow Sze. With present transportation practically limited to junks and coolie carriers it is difficult to arrive at an estimate of probable railroad traffic. Of the productivity of the soil there is no question, and what is known of the mineral resources is encouraging. Coal outcrops at points along the Han, Jen, and Taiping Rivers and elsewhere in the Red Basin. At present it is only mined at such points where it can be worked from simple adits, but it is believed that the entire basin is underlain by coal-bearing rocks. Iron is found near Taiping Sze, asbestos near Hinganfu, copper and the precious metals west of Chengtu.

Probable traffic on the line after due time for establishment—at least one year—is thus estimated by the surveyors: freight crossing the Jen Ho summit going east, 20,000 tons per day; going west, 10,000 tons per day: passenger traffic, about 95 per cent third class, 1,500 people per day per mile each way.

POLAR REGIONS

A Proposed Polar Expedition by Airplane. Late in December of last year the plans were announced (e.g. *New York Times*, December 29, 1918) of a proposed polar expedition by airplane under the leadership of Captain Robert A. Bartlett, the well-known Arctic navigator, and with the support of the Aero Club of America. The plans call for the despatch of a vessel in June of this year to Etah, Greenland, which will serve as one of the main bases. From here a flying base is to be established at Cape Columbia, on the edge of the Polar Sea. Bases are also to be established at Cape Chelyuskin, Siberia, or on Nicholas II Land to the north of it, and at Wrangel Island. Within the triangle defined by these three points lies the greater part of the totally unexplored part of the Arctic. The expedition will be equipped with a large plane, capable, for instance, of making the flight of 1,133 miles from Cape Columbia to Cape Chelyuskin, and several scout planes for shorter flights from the bases, such as from Cape Columbia to the Pole, a distance of 413 miles. In addition it is planned to send a small oil-burning vessel into the Polar Sea from Bering Strait and force her northward far enough so as to avoid the westward coastal current which carried the *Karluk*, in the hope that she will drift across the Pole and emerge on the European side. The expedition is planned to take three years.

GEOGRAPHICAL NEWS

Personal

Mr. C. E. Akeley of the American Museum of Natural History addressed the Aeronautical Society of America on November 26, 1918, in New York City, on ''Exploration in British East Africa.'' Mr. Akeley dwelt upon the part that the airplane will play in the future work of exploration in this region.

Dr. J. G. Bartholomew, head of the well-known Edinburgh cartographic institution of that name, was awarded the Helen Culver Gold Medal by the Geographic Society of Chicago last November.

Professor G. G. Chisholm of the University of Edinburgh was awarded the Helen Culver Gold Medal by the Geographic Society of Chicago last November.

Dr. J. J. Galloway read a paper on February 17 before the New York Academy of Sciences entitled ''Notes on the Geology and Physiography of Yucatan, Mexico.''

Professor C. L. Poor of Columbia University addressed the New York Academy of Sciences on December 2, 1918, on ''Recent Advances in the Art of Navigation.'' Modern methods of finding one's position at sea and in the air were explained, and the new ''line of position computer'' and other instruments were exhibited.

M. Jules Rouch has been awarded the Victor Raulin prize of the Paris Academy of Sciences for his work in meteorology, atmospheric electricity, and physical oceanography.

Professor Frederick Starr of the Department of Anthropology in the University of Chicago addressed the Geographic Society of Chicago on January 10 on ''The Mountain Monasteries of Korea.''

Professor Bailey Willis of Leland Stanford Junior University addressed the Psysiographers Club of Columbia University on November 22, 1918, on ''South America, Its Countries, Its People, Its Industries, and Its Relation with the United States.''

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

United States

North-Central States

Salisbury, R. D., and H. H. Barrows. **The environment of Camp Grant.** 75 pp.; maps, diagrs. *Illinois State Geol. Survey Bull. No. 39.* Urbana, 1918. 10 x 7.

According to the letter of transmittal by the chief of the State Geological Survey and the "Foreword" by the authors, this bulletin evidently has been written to show concretely the influence of geographic factors in the solution of many of the problems of the battle field. It was planned for the men in training at Camp Grant and hence discusses the region in which the camp is located.

The bulletin is divided into four parts, viz. Physical Features, Points of Military Significance, The History of the Land, and Nature and Man in the Rockford Region. The text is illuminated by diagrams and maps, including four folded topographic sheets, 1918, "surveyed in co-operation with the War Department and the State of Illinois." These include the Rockford, Belvidere, Kings, and Kirkland quadrangles. A few of the black-and-white maps show no meridians and parallels. Such basic controls in map construction ought never to be omitted. The bulletin is written for the most part in textbook style, making it convenient for study by classes of men in training, if that should prove desirable.

The bulletin is an adventure in some respects, for it is a direct attempt to offer in elementary form a geographic interpretation planned to be also of practical value to the military man. The first two chapters point in the right direction. The relation of movements of underground water to problems of trenching, the location and selection of materials for road building, the location of well sites with respect to the assurance of an adequate supply of good drinking water—these and many other important problems are clearly presented and must impress the soldier with the large advantage which a knowledge of the principles of geography and geology will offer him and his comrades. The application of the third chapter seems in part open to question. For example, one wonders of what significance it is that several ice sheets should have covered the region or that the surface relief "would be increased 250 feet" if the drift were removed. The fact that the region was glaciated is the vital point. The battle or campaign occurs on the present and not on the past surface. The last chapter is gratuitous, appealing largely to the interest of those people in the locality who may care little for the more technical discussion. As a part of a general publication it is well worth while. The general treatment of the bulletin makes one feel that it has been written hurriedly and therefore does not reflect proper credit upon the writers, whose abilities in the art of clear presentation are well known. For this reason, the inclination is to accept the publication as a well-directed contribution and with the hopes that it will soon be replaced with somewhat more effective material. When the professional man offers the layman something practical, it is of the utmost importance for the sake of the professional world that no opportunity be afforded the layman to criticize the work as "impractical" or "academic."

Eugene Van Cleef

Gagnieur, W. F. **Indian place names in the Upper Peninsula [of Michigan] and their interpretation.** *Michigan Hist. Mag.*, Vol. 2, 1918, No. 3, pp. 526-555. Lansing.

Gregg, W. R. **Free-air data at Drexel [Nebr.] Aerological Station: January, February, March, April, May, and June, 1917.** 101 pp.; diagrs., ill. **July, August, September, October, November, December, 1917.** 108 pp.; diagrs. *Monthly Weather Rev. Suppls. Nos. 10 and 11.* U. S. Dept. of Agriculture, Washington, D. C., 1918. [On this and the next publication see the note on p. 182 of this issue.]

Gregg, W. R. **Free-air data at Drexel, Nebr., and Ellendale, N. Dak., Aerological Stations: January, February, and March, 1918, inclusive.** With a description (pp. 12-13) of the Ellendale Aerological Station by V. E. Jakl. 82 pp.; diagrs., ills. *Monthly Weather Rev. Suppl. No. 12.* U. S. Dept. of Agriculture, Washington, D. C. 1918.

MOORE, R. C. **The environment of Camp Funston.** With a chapter on The Western Theater of War by D. W. Johnson. 81 pp.; maps, diagrs., ills. *State Geol. Survey of Kansas Bull. 4.* Topeka, 1918. [Camp Funston was established near Fort Riley, just below the junction of the Republican and Smoky Hill Rivers, which form the Kansas River. The bulletin is accompanied by an excellent map of the environs of the camp on the scale of 1:40,000; relief is shown in fine black contours supplemented by brown shading; woods are shown in green.]

POSEY, C. J. **The influence of geographic factors in the development of Minnesota.** *Minnesota Hist. Bull.*, Vol. 2, 1918, No. 7, pp. 443-453. St. Paul.

ROBINSON, DOANE, C. E. DELAND, AND O. G. LIBBY. **Additional Verendrye material.** Maps, ills. *Mississippi Valley Hist. Rev.*, Vol. 3, 1916, No. 3, pp. 368-399. Cedar Rapids, Iowa. [On the explorer of the northern Great Plains area, 1738-1742. See the note on "Eighteenth Century Explorations in the Middle-West: The routes of the Verendryes" in the *Review*, Vol. 6, 1918, pp. 283-284.]

SHIPPEE, L. B. **The first railroad between the Mississippi and Lake Superior.** *Mississippi Valley Hist. Rev.*, Vol. 5, 1918, No. 2, pp. 121-142. Cedar Rapids, Iowa.

WHITSON, A. R., W. J. GEIB, G. W. CONREY, AND A. E. TAYLOR. **Soil survey of Columbia County, Wisconsin.** iv. and 84 pp.; maps, ills. *Wisconsin Geol. and Nat. Hist. Survey Bull. No. 49: Soil Ser. No. 14.* Madison, 1916.

WHITSON, A. R., W. J. GEIB, T. J. DUNNEWALD, C. B. POST, W. C. BOARDMAN, A. R. ALBERT, A. E. TAYLOR, L. R. SCHOENMANN, AND CARL THOMPSON. **Reconnoissance soil survey of the north part of north central Wisconsin.** ii and 80 pp.; maps, ills. *Wisconsin Geol. and Nat. Hist. Survey Bull. No. 50: Soil Ser. No. 15.* Madison, 1916.

WHITSON, A. R., W. J. GEIB, O. J. NOER, AND A. H. MEYER. **Soil survey of Jefferson County, Wisconsin.** 78 pp.; maps, ills. *Wisconsin Geol. and Nat. Hist. Survey Bull. No. 48: Soil Ser. No. 13.* Madison, 1916.

WHITSON, A. R., W. J. GEIB, CARL THOMPSON, C. B. POST, A. L. BUSER, L. R. SCHOENMANN, AND A. E. TAYLOR. **Reconnoissance soil survey of north eastern Wisconsin.** iv and 87 pp.; maps, ills. *Wisconsin Geol. and Nat. Hist. Survey Bull. No. 47: Soil Ser. No. 12.* Madison, 1916.

WRIGHT, G. F. **Explanation of the abandoned beaches about the south end of Lake Michigan.** Maps, ill. *Bull. Geol. Soc. of Amer.*, Vol. 29, 1918, No. 2, pp. 235-244.

—— ***[Topographic map of the United States.]*** Sheets, 1:62,500: (1) ***Altenburg,*** (2) ***Dixon,*** (3) ***Good Hope,*** (4) ***La Harpe,*** (5) ***Morris,*** (6) ***Vermont, Ill.;*** (7) ***College Corner, Ind.-Ohio;*** (8) ***Cedar Springs,*** (9) ***Ionia,*** (10) ***Lowell, Mich.;*** (11) ***Felicity,*** (12) ***Fort Recovery,*** (13) ***Seaman, Ohio.*** U. S. Geological Survey, Washington, D. C., 1918.

—— ***North Dakota, State of.*** Compiled from official Records of the General Land Office and other sources under the direction of I. P. Berthrong. 1 in.:12 miles (1:760,320). General Land Office, Dept. of the Interior, Washington, D. C., 1918.

Western States

KEARNEY, T. H., L. J. BRIGGS, H. L. SHANTZ, J. W. MCLANE, AND R. L. PIEMEISEL. **Indicator significance of vegetation in Tooele Valley, Utah.** Map, diagrs., ills. Reprint from *Journ. of Agric. Research*, Vol. 1, 1914, No. 5, pp. 365-417. U. S. Dept. of Agriculture, Washington, D. C.

A paper of more than ordinary interest to plant geographers. One of its authors (Shantz) in an earlier paper described the correlation which exists between the vegetation types of the Great Plains and the physical characteristics of the soil; and from that he has drawn comparisons between the native growth and the suitability of the land for dry farming. The intensive study of Tooele Valley has carried this work much further. It is now possible to demonstrate (1) that a sagebrush (*Artemisia tridentata*) "association," when in good stand, indicates land that is well adapted to dry farming and irrigation; (2) that the Kochia (*Kochia vestita*) "association" denotes that dry farming is precarious owing to the small depth of soil free from alkali; (3) that the shadscale (*Atriplex confertifolia*) "association" indicates that dry farming is nearly as precarious as on Kochia land but that where water is available for irrigation the salts can probably be leached out of the soil; and (4) that the greasewood shadscale (*Sarcobatus vermiculatus* and *Atriplex confertifolia*) "association" grows on land which is not suitable for dry farming but which can be made to produce good crops under irrigation. The relation between the root development and the conditions of soil moisture is shown in an accompanying diagram. The report contains a detailed map of the Tooele Valley on the south shore of Great Salt Lake.

Twitchell, R. E., edit. **Historical sketch of Governor William Carr Lane, together with diary of his journey from St. Louis, Mo., to Santa Fe, N. M., July 31st, to September 9th, 1852.** 62 pp.; ills. *Hist. Soc. of New Mexico* [*Publ.*] *No. 4,* [n. p.] 1917. 9 x 6.

Lane was appointed Governor of New Mexico by President Fillmore, and the journal records the incidents of his overland trip to the Territory of New Mexico, then only slightly known. He sets forth the potentialities of the territory in his first message to the Legislative Assembly (reproduced in the introduction), dwelling especially on the hydrography, while the annotator notes at length the controversy over the southern boundary, which arose from a question of national jurisdiction. Governor Lane's proclamation on the subject is included. The diary itself, comprising pages 23-62, is thoroughly elucidated by Mr. Twitchell, the notes shedding much light on the geography of the country through which passed the Santa Fe Trail. F. W. Hodge

Fewkes, J. W. **Types of prehistoric Southwestern architecture.** *Proc. Amer. Antiquarian Soc. at the Semi-Ann. Meeting Held in Boston Apr. 11, 1917,* Vol. 27 (N. S.), 1917, Part I, pp. 67-82.

Freeman, O. W. **Geographic influences affecting distribution of population and character of industries in Montana.** Reprinted from *Inter-Mountain Educator,* 1916, Jan. [7 pp.] [Abstracted in the *Review,* Vol. 1, 1916, p. 217.]

Reed, W. G. **Rainfall data of Berkeley, California.** *Univ. of California Publs. in Engin.,* Vol. 1, 1915, No. 5, pp. 69-81. [Rainfall has been measured at Berkeley at least once a day since the establishment of the meteorological station at the University of California in 1887. More frequent observations have also been made from time to time, although the practice has varied. In view of the fact that the published rainfall data for the eastern San Francisco Bay region are rather scanty, Mr. William G. Reed has assembled the above data in this paper. The tables include the monthly and seasonal rainfall; number of days with 0.01 inch or more; greatest rainfall in 24 consecutive hours; and precipitation of marked intensity (see *Geogr. Rev.,* Vol. 2, 1916, pp. 385-386).—R. DeC. Ward.]

Robbins, W. W., J. P. Harrington, and Barbara Freire-Marreco. **Ethnobotany of the Tewa Indians.** xii and 124 pp.; map, ills., bibliogr., index. *Bur. of Amer. Ethnol. Bull. 55.* Smithsonian Institution, Washington, D. C., 1916. [Contains a section of geographic interest entitled ''Cultivated Plants,'' which cites growing improvidence among the Tewa Indians near the railways; and also an archeological map of the Jemez Plateau and a good bibliography with several ethnogeographical entries.]

Rolfe, F. **Commercial geography of southern California.** 63 pp.; maps, diagrs., ills., index. [Biola Press, Los Angeles,] 1915. 8 x 5.

—— ***Lake Washington Ship Canal, Puget Sound to Lake Washington, Washington.*** 1:10,000. *U. S. Coast and Geodetic Survey Chart No. 6447.* Washington, D. C., Aug., 1918.

—— ***San Diego Bay, California.*** 1:20,000. *U. S. Coast and Geodetic Survey Chart No. 5107.* Washington, D. C., May, 1918.

—— [***Topographic map of the United States.***] Sheets: (1) ***Berenda,*** (2) ***Lingard,*** (3) ***Owens Creek,*** (4) ***Spring Valley, Cal.,*** 1:31,680; (5) ***Paradise Valley, Idaho,*** 1:62,500; (6) ***Heart Butte, Mont.,*** 1:125,000; (7) ***Stockton, Utah,*** 1:62,500. U. S. Geol. Survey, Washington, D. C., 1918.

EUROPE

Switzerland, or the Alps

Scheffel, P. H. **Verkehrsgeschichte der Alpen.** Vol. 1: **Bis zum Ende des Ostgotenreiches Theodorichs des Grossen.** viii and 206 pp. 1908. 11s. 3d. Vol. 2: **Das Mittelalter.** viii and 297 pp. 1914. 16s. Dietrich Reimer (Ernst Vohsen), Berlin. 10½ x 8.

A history of trade and transportation in the Alps might well constitute a monumental monograph in the field of historical geography. The author of the present volumes has hardly realized such a success, although here and there some carefully finished passage shows the attainment of a high level that is not sustained by the text in general. The deficiencies of the volumes are apparent, possibly more so than real. One looks in vain for a single picture, diagram, map—an illustration of any sort. Yet in the first volume Roman place names crowd the pages and in many cases are not located readily even by the classical student. References are furnished very sparingly. As yet no index is available, although one is promised. The title itself is somewhat misleading, as trade is a minor consideration in a large proportion of the chapters.

The set, nevertheless, is valuable to the student of Alpine affairs. The author is generously appreciative of geographic factors in history and has supplied in Volume 2 a good introductory chapter on "Natural Forces in the History of Alpine Regions." Three types of historical movements are taken up, namely the migrations and lesser shiftings of races, military expeditions, and commercial developments. Apparently one additional volume is planned. Most of the chapters are organized in historical sequence, a number, however, being concerned directly with highways of different periods. Thus, Chapter 6, Volume 1, deals with Roman roads, and the latter part of Volume 2 is an elaborate account of Alpine roads in the Middle Ages. The author has taken especial interest in the knotty problems of racial history in the Alps, most particularly in that of the Rhaeto-Romansh. Chapter 7, Volume 2, is a contribution of merit on racial conditions in medieval times. To the American reader the difficulties of research in European historical geography are made manifest, especially in two ways, first by the testimony of finds of antique coins on the beginnings, extent, and interruptions of Roman and pre-Roman colonization and trade, and secondly, by tracing through the origin of place names, family names, and even of traditions otherwise unrecorded racial movements. CARL O. SAUER

ANFOSSI, G. **Il lago di Märjelen.** Map. *Riv. Geogr. Italiana,* Vol. 23, 1916, No. 4-5, pp. 202-209. Florence. [Lake Märjelen is a small lake on the eastern side of the Aletsch Glacier in the Bernese Oberland.]

COOLIDGE, W. A. B. **Il Col d'Hérens (3480 m.) nella storia.** *Riv. Mensile Club Alpino Italiano,* Vol. 35, 1916, No. 7, pp. 185-197. Turin. [The Col d'Hérens is a glacier pass leading from the head of the Val d'Anniviers, a left tributary of the upper Rhone, to Zermatt at the foot of the Monte Rosa massif.]

FRESHFIELD, D. W. **The great passes of the Western and Central Alps.** Map, ills. *Geogr. Journ.,* Vol. 49, 1917, No. 1, pp. 2-26 (discussion, pp. 22-26). [Substantially the same paper was published in *Alpine Journ.,* No. 215, Vol. 31, 1917, pp. 158-189.]

HAUSER, HENRI. **La position géographique de la Suisse: Étude de géographie politique.** *Ann. de Géogr.,* No. 138, Vol. 25, 1916, pp. 413-428. [Abstracted in the *Review,* Vol. 3, 1917, p. 401.]

HORWITZ, M. L. **Sulla variabilità assoluta della temperatura annuale nella Svizzera.** *Boll. Bibliogr. No. 4,* 1916, pp. 7-8. Ufficio Idrografico, R. Magistrato alle Acque, Venice. [Abstract of an article published in *Archives des Sci. Physiques et Naturelles,* 1916, Aug. 15, Geneva.]

LORENZI, ARRIGO. **La funzione politica delle Alpi.** *Riv. Geogr. Italiana,* Vol. 23, 1916, No. 4-5, pp. 153-176. Florence.

LÜTSCHG, O. **Il lago di Märjelen.** *Boll. Bibliogr. No. 4,* 1916, pp. 25-26. Ufficio Idrografico, R. Magistrato alle Acque, Venice. [Review of a work published in 1916 in Geneva.]

ROCCATI, ALESSANDRO. **Il glacialismo nelle Alpi Marittime.** Ills. *Riv. Mensile Club Alpino Italiano,* Vol. 35, 1916, No. 2, pp. 41-47; No. 3, pp. 75-80. Turin.

RODRÍGUEZ, E. M. **Suiza: Noticia general geográfica y estudio especial de su geografía postal y de comunicaciones.** *Rev. de Geogr. Colon. y Mercantil,* Vol. 14, 1917, No. 1-2, pp. 10-40; No. 3, pp. 82-111. Real Soc. Geogr., Madrid.

ROEMER, ADOLF. **Klimatologisches über das St. Gallische Gebiet zwischen Walen- und Zürichsee.** Map. *Mitt. Ostschweizerischen Geogr. Commerc. Gesell. in St. Gallen,* 1915, No. 1-2, pp. 38-59. St. Gall.

SACCO, FEDERICO. **I ghiacciai antichi e attuali delle Alpi Marittime centrali.** Map. *Atti Soc. Italiana di Sci. Nat.,* Vol. 51, 1912, pp. 99-128. Pavia. [With map showing the great size of the Pleistocene glaciers compared with those known at present.]

Tschudi, Iwan von. **Der Tourist in der Schweiz und Grenzgebieten.** Newly revised with preface by C. Täuber. Vol. 1: **Nordschweiz und Westschweiz.** xl and 193 pp.; maps, diagrs. Vol. II: **Urschweiz und Südschweiz.** Pp. vii and 195-370; maps, diagrs., ills. Art. Institut Orell Füssli, Zürich, 1916 and 1917. 6 x 4.

Italy

Andriani, Giuseppe. **Il Finale ligústico.** Map. *Boll. Reale Soc. Geogr. Italiana,* Vol. 5, 1916, No. 10, pp. 824-846. Rome. [Finale is a town on the Riviera di Ponente.]

Anfossi, Giovanni. **I laghi dell'Appennino settentrionale e la loro distribuzione.** Map, diagr., bibliogr. *Riv. Geogr. Italiana,* Vol. 22, 1915, No. 9-10, pp. 425-457. Florence.

Anfossi, Giovanni. **Le isole lacuali italiane.** Diagrs. *Boll. Reale Soc. Geogr. Italiana,* Vol. 6, 1917, No. 7-8, pp. 551-563. Rome.

Anfossi, Giovanni. **Premières recherches sur l'évaporation d'un lac de l'Apennin génois.** *Recueil des Trav. de l'Inst. de Géogr. Alpine,* Vol. 5, 1917, No. 1, pp. 115-127. Grenoble.

Anfossi, Giovanni. **Volumetria delle isole minori italiane (Studi orometrici, III).** Diagrs. *Memorie Geogr.* (Suppl. to *Riv. Geogr. Italiana*) *No. 31* (= Vol. 10, pp. 223-285). Florence, 1916. [The methods employed in a study of this kind, in which the volume of a land mass is determined, were outlined in a review of a similar work in the *Review,* Vol. 3, 1917, pp. 162-163.]

Arbos, P. **Études sur l'habitat de montagne en Italie.** *Recueil des Trav. de l'Inst. de Géogr. Alpine,* Vol. 4, 1916, No. 2, pp. 259-274. Grenoble.

Azzi, G. **Le problème de la météorologie agricole.** *Rev. Gén. des Sci.,* Vol. 29, 1918, May 30, pp. 307-311. [With special reference to the cultivation of wheat in Italy.]

Baratta, Mario, Torquato Taramelli, Alessandro Martelli, Giotto Dainelli, and Paolo Vinassa de Regny. **Pagine geografiche della nostra guerra: Raccolta delle conferenze tenute nell'anno 1916 alla Reale Società Geografica Italiana.** 179 pp.; maps, diagrs., ills. Rome, 1917. [Apropos of the territorial aspirations voiced by the Italian press this publication is of interest. It is a collection of papers read before the Society during the year 1916 and deals with the geographical aspects of the Italo-Austrian frontier region. It reflects the Italian viewpoint, emphasizing the geographical basis for Italy's coveted control of the Adriatic.]

Bénévent, E. **La plaine du Pô: Étude de géographie humaine d'après le livre de M. Arrigo Lorenzi.** *Recueil des Trav. de l'Inst. de Géogr. Alpine,* Vol. 4, 1916, No. 2, pp. 189-236. Grenoble. [Abstracted in the *Review,* Vol. 5, 1918, pp. 147-148.]

Bianchi, Adele. **La Cioceria: Monografia corografica.** Ills., bibliogr. *La Geografia,* Vol. 4, 1916, No. 2-3, pp. 85-99; No. 4-7, pp. 230-255. Novara. [The valley of the Sacco between the Ernici and Lepini ranges in Latium.]

Boucher, E. S. **Sardinia in ancient times.** 185 pp.; map, bibliogr., index. B. H. Blackwell, Oxford, 1917. 8 x 5.

Brian, Alessandro. **Carte geografiche del Genovesato e dell'Isola di Corsica del secolo XVIII (contributo per la storia della cartografia Ligure e Corsa).** Maps, bibliogr. *Atti Soc. Ligustica di Sci. Nat. e Geogr.,* Vol. 26, 1915, No. 2, pp. 39-56. Genoa.

Cabrini, Angiolo. **Emigrazione ed emigranti.** *Riv. Coloniale,* Vol. 11, 1916, No. 9, pp. 458-471; No. 10, pp. 595-608; No. 11, pp. 662-669. Rome. [Italian emigration.]

Canavari, Igino. **La carta geo-agronomica di Casalina (Perugia).** 38 pp.; map. Reprint from *Atti Soc. Toscana di Sci. Nat.,* Vol. 29. Pisa, 1913.

Checchia-Rispoli, G. **I terrazzi delle pendici meridionali del Gargáno.** Map. *La Geografia,* Vol. 4, 1916, No. 4-7, pp. 255-259. Novara. [Monte Gargáno occupies the "spur" of Italy's boot.]

Colamonico, Carmelo. **La distribuzione della popolazione nella Puglia centrale e meridionale secondo la natura geologica del suolo.** Maps, diagrs. *Boll. Reale Soc. Geogr. Italiana,* Vol. 5, 1916, No. 3, pp. 201-234; No. 4, pp. 274-305; No. 5, pp. 403-429. Rome.

Colamonico, Carmelo. **La piovosità della terra d'Otranto.** Maps, diagrs. *Boll. Reale Soc. Geogr. Italiana,* Vol. 6, 1917, No. 7-8, pp. 509-537. Rome.

Colamonico, Carmelo. **Zone di piovosità e densità di popolazione nella provincia di Lecce.** Maps. *Riv. Geogr. Italiana,* Vol. 24, 1917, No. 5, pp. 161-180. Florence.

Corti, Alfredo, and Walther Laeng. **Le Alpi di Val Grosina.** ix and 106 pp.; map, ills., index. (Gruppo Lombardo Alpinisti senza Guide.) Stabilimento Tipografico "Luzzago," Brescia, 1909. L. 3. 6 x 4.

Cossu, Angelo. **L'isola di Sardegna: Saggio monografico di geografia fisica e di antropogeografia.** 222 pp.; diagr., ills., bibliogr. Società Editrice Dante Alighieri de Albrighi, Segati & C., Milan, etc., 1916. L. 2.50. 8½ x 5½.

Ricchieri, Giuseppe. **L'insegnamento della geografia nella progettata revisione dei programmi delle scuole medie.** *Boll. Reale Soc. Geogr. Italiana,* Vol. 7, 1918, No. 7-8, pp. 553-571. Rome.

Sbrocca, A. **Variazioni nella circoscrizione territoriale dei comuni.** Map. *Boll. Reale Soc. Geogr. Italiana,* Vol. 7, 1918, No. 7-8, pp. 586-596. Rome.

AFRICA

Sahara, including Egypt

Hurst, H. E. **The magnetic survey of Egypt and the Sudan.** 53 pp.; maps. *Survey Dept.* [*of Egypt*] *Paper No. 33.* Ministry of Finance, Cairo, 1915.

Loft, Genivera. **The caravan trade of the Sahara.** Map, bibliogr. *Journ. of Geogr.,* Vol. 15, 1916-17, No. 7, pp. 221-226. [An informing compilation of facts about caravan routes in the Sahara, their location, the nature of the caravans that traverse them, perils of the route, caravan leaders, nature of the commerce, and its general decline.]

Masi, Corrado. **Alle frontiere della Libia.** xxxii and 191 pp.; ills. F.lli Lambruschini, Empoli, 1915. 10 x 7.

Olufsen, Ole. **Muhammedanske Grave og Gravminder i Sahara og Tunisien.** Diagrs., ills. *Geografisk Tidskrift,* Vol. 23, 1916, No. 6, pp. 205-224; No. 7, pp. 247-257. Copenhagen.

Rolfe, Deette. **Geographic influences in the political development of ancient Egypt.** *Bull. Geogr. Soc. of Philadelphia,* Vol. 14, 1916, No. 4, pp. 169-174.

Schiaparelli, Ernesto. **La geografia dell'Africa orientale secondo le indicazioni dei monumenti egiziani.** viii and 307 pp.; ills. R. Accademia dei Lincei, Rome, 1916. 12 x 9.

ASIA

General

Herbertson, A. J., and O. J. R. Howarth, edits. **The Oxford survey of the British Empire. Vol. 2: Asia, including the Indian Empire and dependencies, Ceylon, British Malaya and Far Eastern possessions.** x and 505 pp.; maps, ills., index. Clarendon Press, Oxford, 1914. 14s. 9 x 6.

This volume is one of a series of six covering the respective parts of the British Empire, of which the others have already been noticed (America, *Bull. Amer. Geogr. Soc.,* Vol. 47, 1915, pp. 971-972; Africa, *Geogr. Rev.,* Vol. 1, 1916, p. 70; Australasia, *ibid.,* Vol. 6, 1918, p. 380; The British Isles and Mediterranean possessions, and General Survey, *ibid.,* Vol. 7, 1919, pp. 61-62). The reviewer has found the volume of much value for reference. The twelve authors are men of high ability whose names carry weight. The book is intended to be a "survey . . . of the geographical and allied aspects" of the British possessions in Asia "together with their economic, administrative, and social conditions at the present time." This intention is well carried out in the chapters dealing with smaller possessions, but not so well in the case of India. For instance, Professor Gardiner gives an admirable picture of the Maldive and Laccadive Islands. To be sure, his chapter is stronger in its discussion of coral reefs than in its account of the people, but this does no harm, for other chapters emphasize other phases. Thus in the chapter on Ceylon Dr. Willis gives a strong botanical flavor, to which is joined a good deal of archeology, while in the Malay chapter Mr. Graham is particularly strong in his insight into the character of the people. He feels that the art for which they are sometimes praised was never great and is now declining. They seem to be an inefficient people, best adapted to easy work, such as copra raising. The chapter on Borneo is especially interesting because of its emphasis on the way in which a high-minded man like Rajah Brooke can improve the condition of the natives. It will surprise many to learn that the famous Rajah has purposely retarded the construction of roads and railroads. They bring in outsiders such as the Chinese or Europeans, and thus the poor, incompetent natives are at a disadvantage and gradually go to the wall, as the Malays are fast doing in the Malay Peninsula.

In spite of 300 pages devoted to India the reader receives a much less vivid impression of that country than of the smaller British possessions. Yet many chapters are admirable. For instance, in discussing the vegetation, forestry, and fauna Mr. Eardly-Wilmot is peculiarly happy in pointing out the importance of the forests, which cover 20 per cent of the area and furnish reserve pasturage for the cattle in times of drought. Other chapters, such as those on ''Agriculture,'' ''Industrial and Economic Conditions,'' ''Languages, Customs, and Religions,'' and ''Political Government and Administration,'' are crammed with valuable facts but are so encyclopedic that they are not adapted to general reading.

The most disappointing feature of the book is that it gives little insight into the life of the Indian people. The section on customs, for example, is devoted entirely to a long series of short statements as to customs in respect to marriage and death. Certain other important matters are also treated inadequately. For example, the chapter on agriculture contains the statement that ''the Indian budget is a gamble against rain,'' but nowhere does the book contain more than incidental references to the famines, which are perhaps the most important feature in the economic life of India.

The concluding chapter on India—''Western Influence'' by Mr. R. C. Temple—is a masterly treatment of the problem created by the meeting of a fully developed Oriental system and a fully developed Western system. ''Caste may be good as a moral restraint, particularly in its reference to women, but it is very bad for political unity, for no two castes work together.'' This fact has made it easy for the British to rule. The power of caste, however, is being broken. Educated natives are examining the pedigrees of many of the high castes and finding that there is no such purity of blood as has been claimed. Railways, as everyone knows, are deadly enemies of caste because people of all kinds must crowd together. Christian missions and good government are giving the lower castes a new spirit of self-respect. Hence Indian society is being subjected to a great upheaval from beneath. From above there is also a spirit of unrest because of the growth of an educated middle class—a thing never before existing in India.

The attitude of the various classes toward Britain is peculiarly interesting at the present juncture. The educated middle class is sharply split into satisfied, pro-British office holders, and dissatisfied non-office-holders. The lower castes are pro-British. So too are the native princes, for their own position depends on the maintenance of the British Empire. Other small, but powerful groups like the Parsis and Armenians are likewise pro-British, and do much to maintain the Empire. The interplay of such varied forces makes India well-nigh the most interesting country in the world. Therefore a volume such as this is welcome and is sure to be frequently referred to.

Ellsworth Huntington

Reclus, Onésime, edit. **Grande Géographie Bong illustrée: Les pays et les peuples: Vol. 3 [Scandinavia, and Asia].** 448 pp.; maps, diagrs., ills. Charles Rabot: **La Scandinavie (Norvège, Suède, Danemark, Islande),** pp. 3-68; Paul Labbé: **Sibérie,** pp. 71-110; D. Aïtoff: **Asie occidentale turque et arabe,** pp. 113-160; D. Aïtoff: **Asie intérieure,** pp. 163-192; Jules Harmand: **Perse,** pp. 195-212; Henri Cordier: **Chine,** pp. 215-274; Paul Labbé: **La Mantchourie,** pp. 275-280; Jules Harmand: **Empire indo-britannique,** pp. 283-348; H. de Lamothe: **Péninsule indochinoise,** pp. 351-380; Henri Froidevaux: **Japon,** pp. 383-412; Jules Harmand: **Inde néerlandaise,** pp. 415-438. Bong & Cie., Paris, 1913. 15 x 12.

The sketches of Asiatic geography assembled in this volume form well-balanced descriptions of a particularly interesting continent. The authors provide attractive passages on the whole of the great region from Siberia to Ceylon and from Arabia to Japan and the Dutch Indies. Basing their work primarily on relief, they show that natural features have determined the trend of routes and the distribution of populations; but it is mainly the writers' simplicity and their ability to maintain presentation at an agreeable level that give value to their pages.

The spirit of Reclus and his ideals live in this work even though the exhaustiveness which characterized the eminent geographer's masterpiece is far from having been

ttained. The Grande Géographie Bong, however, has the greater advantage of afford-
ng up-to-date information. Many historical notes, incorporated in the text, are welcome
o the historian inclined to fall back upon geography to explain fundamental relations
n his own field.

In many places the descriptions might well have been lengthened; yet the reader is
iven all that he would naturally look for in a general work of this character. The
nly omission that is really felt is a chapter devoted to Asia as a whole, in which a
omprehensive survey might have been presented by way of introduction. Such a chapter
night have taken the space reserved for Scandinavia. As it is, the inclusion of northern
urope in a volume otherwise solely devoted to Asia appears awkward.

The reader is therefore trusted to supply the generalization needed in the broad
utlook which takes in the world's largest continent. There is zest in this search, and
ith a little diligence some interesting relations may be worked out. For one thing the
ntimate connection between eastern and western Asia is brought out. This is necessary
or a better understanding of the continent, its men and ideals. Furthermore, vital
roblems growing out of the war will have to be settled in both eastern and western
sia. For a preliminary acquaintance with these problems as well as with the regions
ffected, the inquisitively minded reader may resort to this volume with profit.

The mechanical make-up of this work is of exceptional excellence. Splendidly colored
lustrations showing localities of scenic or historical fame have been reproduced in full-
age size. Included among them is an occasional reproduction of masterpieces by native
rtists. The maps are clear and of atlas quality, many being colored. Three other
olumes in the series have already been reviewed (Vol. 4, Africa, *Geogr. Rev.*, Vol. 4,
917, p. 327; Vols. 1 and 2, Europe, *Geogr. Rev.*, Vol. 6, 1918, p. 378).

CITATI, PIETRO. **La via maestra alle Indie e le sue succursali.** *Riv. Militare*
taliana, Vol. 40, 1915, No. 10, pp. 1943-1965. Rome. [Sea route to India.]

COOPER, C. S. **The modernizing of the Orient.** 353 pp.; ills., index. McBride,
ast & Co., New York, 1914. $2.00. 8½ x 5½.

DAVIES, A. M. **The problem of the Himalaya and the Gangetic trough.** *Geogr.*
ourn., Vol. 51, 1918, No. 3, pp. 175-183. [Review of recent literature on the structure
f the Himalayas and the Gangetic Plain as elucidated by deviations of the plumb line.]

DINGELSTEDT, V. **Tatar tribes.** *Scottish Geogr. Mag.*, Vol. 33, 1917, No. 5, pp.
09-226.

ECKARDT, W. R. **Über Luftdruckverteilung und Regenfall in Asien, mit be-**
onderer Berücksichtigung der Randgebiete. Maps. *Annal. der Hydrogr. und*
arit. Meteorol., Vol. 44, 1916, No. 11, pp. 542-554. Hamburg.

H[INKS], A. R. **The identification of peaks in the Himalaya.** With note by
olonel Sir Sidney Burrard. *Geogr. Journ.*, Vol. 52, 1918, No. 3, pp. 184-193.

KELLAS, A. M. **A consideration of the possibility of ascending the loftier**
imalaya. Diagrs., ills. *Geogr. Journ.*, Vol. 49, 1917, No. 1, pp. 26-48 (discussion,
. 46-48). [Considers especially physiological difficulties of high altitudes.]

MACHATSCHEK, FRITZ. **Japan, China, und Russland.** *Österreichische Monatsschr.*
ir den Orient, Vol. 41, 1915, No. 9-12, pp. 284-286. Vienna.

OKADA, T. **Some researches in the Far Eastern seasonal correlations.** Diagrs.
onthly Weather Rev., Vol. 45, 1917, No. 5, pp. 238-240. [This is a continuation of the
per that appeared in the *Monthly Weather Rev.*, Jan., 1916 (pp. 17-21), and was noted
the *Geogr. Rev.*, Vol. 2, 1916, p. 166.]

RIVETTA, P. S. **Verso un nuovo equilibrio dell'Asia: Causa e importanza del**
attato russo-giapponese nell'estremo e prossimo Oriente. Map. *Riv. Coloniale*,
ol. 11, 1916, No. 10, pp. 569-579; No. 11, pp. 641-653. Rome.

SCHOFF, W. H. **The transcontinental silk trade at the Christian era.** Map, ills.
print from *Proc. Numismatic and Antiquarian Soc. of Philadelphia*, Vol. 27, [1915],
. 47-64. [By "at the Christian era" is meant at the beginning of the Christian era,
roughly from 100 B. C. to 100 A. D.]

TAI, TSE TSAN. **The creation. The real situation of Eden and the origin of**
e Chinese. ix and 45 pp.; maps, ill. Kelly & Walsh, Ltd., Hongkong, 1914. $2.00.
x 5½. [The author places the "Garden of Eden," i.e. the cradle of the human race,
Chinese Turkestan.]

INDIA

GAIT, E. A. **Census of India, 1911. Vol. 1: Part I: Report.** xi, 450, and xviii pp.; maps, diagrs., index. **Vol. 2: Part II: Tables.** 439 pp. Superintendent of Government Printing, Calcutta, 1913. Vol. 1, 7s. 6d.; Vol. 2, 6s. 13½ x 8½ each.

The Census of India is interesting because it counts the huge number of 315,000,000 people; because it was made in the one moonlight night of March 10, 1911, by a force of 2,000,000 enumerators and superintendents, mostly natives of India; because it cost less than $700,000; and because the totals were completely reported in nine days—indeed, the two native states Rampur and Sarangarh had complete reports for all parts of the two states ready to telegraph the totals to Calcutta at 8 o'clock on the morning of March 11. The general method was to prepare the schedules for everyone at his customary place of residence several weeks in advance and merely revise the schedules on the appointed date. Some of the most striking errors were made by Europeans, who were allowed to enumerate themselves.

As a great majority of the people of India depend on agriculture for a living, the climate is of great importance and is described in the report with some detail, the monsoons being regarded as the main control for almost all of India. An annual rainfall of 70 inches is needed to ensure crops, and rainfall is a most important factor in the whole distribution of population. The country is divided into sixteen natural divisions, based on rainfall, and these are described at some length. It is not true that population density in India is proportional to the amount of rainfall, but among the natural divisions with less than 40 inches of rain there is "a general correspondence between the rainfall and the density of population." Irrigated areas have a population out of all proportion to their rainfall. Of irrigated lands India has now 35,000 square miles. But even irrigation is quite secondary to surface. The most important of all controls of population density is levelness of surface. Level land may all be cultivated and does not waste by erosion. Hilly land drains dry too readily and washes badly. Terracing must be resorted to; but that demands a deep soil, is costly, and is after all a poor substitute for level land. Even soil is less important in India than surface configuration.

Urban life in India is lived in places of more than 5,000 people, which are hardly more than large villages, without the schools, institutions, trade, and industry that characterize the towns. On this basis less than 10 per cent of the population is urban as compared with 78 in England and Wales and 46 in Germany. The range is from 18 per cent in Bombay, the region of cotton mills, to 3 per cent in Assam, the land of wild peoples. A peculiarity of the larger towns is their small proportion of females, most extreme in Calcutta, where they are but a third as numerous as males. Immigration of male factory workers to the large cities, unaccompanied by their families, has swelled their population. Of cities of 100,000 India has but 30, to 44 in the United Kingdom and 50 in the United States. City life is not well developed in this land; nevertheless there are 28,000,000 people living in cities, two of which have over 1,000,000 each.

One consequence of so general a dependence on agriculture is the liability to famine when the rain fails. But relief programmes are carefully organized and kept up to date so as to be put in operation at a moment's notice.

MARK JEFFERSON

PHYSICAL GEOGRAPHY

METEOROLOGY

—— **Meteorology, Introductory. Prepared and issued under the auspices of the Division of Geology and Geography, National Research Council.** xii and 150 pp.; maps, diagrs., ills., bibliogr. Yale University Press, New Haven, 1918. $1.00. 9 x 6.

The Committee on Education and Special Training of the War Department wisely included meteorology among the subjects to be studied in the Students' Army Training Corps. To meet the needs of both teachers and students this volume was prepared, under the auspices of the National Research Council, as an emergency text. The specific object for which the book was planned ceased to exist almost immediately after the volume came from the press. There has, however, for some years been increasing need of a textbook of meteorology for general use in college courses, which is up to date, not too advanced in character, and purchasable for a moderate price. Whether the volume now before us fills, or can be so modified as to fill, that manifest need has been the question in the mind of the reviewer and will probably also be the question which will interest many of those who know that the new text is now available.

In the great need of haste in the preparation of this book it was natural and proper that the National Research Council should have entrusted the work to the Weather Bureau in Washington, among several of whose staff the various topics were distributed. The major part of the book was prepared by Professor W. J. Humphreys and is to a considerable extent taken from that writer's papers on the physics of the air recently published in the *Journal of the Franklin Institute.* Other sections were contributed by A. J. Henry, J. Warren Smith, S. P. Fergusson, C. F. Talman, and W. R. Gregg. It is distinctly to the credit of the Weather Bureau that the volume was prepared so promptly.

Characterizing the book as a whole, it may be described as a series of very compact, independent, and rather loosely connected chapters dealing with various meteorological subjects, with marked emphasis on the more distinctly physical aspects of the science, and strikingly lacking the human element. The successive sections deal with the atmosphere; measurement of the meteorological elements; atmospheric temperatures (vertical and horizontal distribution); atmospheric pressure; evaporation and condensation; fogs and clouds; general and secondary circulation of the atmosphere; forecasting, and climate. A short bibliography is also included. Recognizing the extraordinary haste in the preparation of the volume and the necessary difficulties attending its publication in the war emergency, it would naturally be unfitting in the reviewer to venture upon any extended or critical discussion of the book. Noting, however (p. vi), that ''criticism is invited to the end that a second edition may show improvement and better adaptation to its purpose,'' he is encouraged to make a few suggestions.

What the book most needs is a general revision which may better adapt it for use in teaching. This would involve a closer co-ordination of the separate chapters; a fuller, but yet a clear and simple explanation of some of the more difficult subjects, such, for example, as the effects of the earth's rotation; the omission of sections which seem unnecessary in an introductory meteorology, as, for instance, that on atmospheric optics (except for very brief mention), and some of the detailed discussion of vertical temperature gradients and of certain of the less commonly used instruments; a more systematic arrangement of such matters as winds, where a good working classification, such as that suggested by Professor W. M. Davis, helps immensely in teaching; and the addition of a chapter on rainfall, which is now wholly lacking. Considerable revision of the more complex portions of the sections on evaporation and condensation and on the general circulation of the atmosphere would make those subjects more intelligible to the average reader and would therefore further the use of the volume as a textbook. One additional element which is of the greatest importance in making the subject interesting and popular is the need of frequent emphasis on its varied human relations. Few sciences touch man more closely, or at so many different points. If a study of meteorology is to become what it should become, general, popular, and practical, then those who teach it should let no opportunity pass to emphasize the many and varied relations which exist between atmospheric phenomena and the life of man. At present the volume before us lacks, almost completely, this vital interest. Indeed, there is in it only one direct reference to this essentially human and therefore popular aspect of meteorology, that (p. 93) which notes the effect of a mirage on a certain military engagement in Mesopotamia during the war.

To sum up: In its present form, the volume does not seem to be adapted for use as a textbook, although most of it could, without much difficulty, and without greatly increasing the size and cost of the volume, be revised in such a way as to make a second edition a valuable and much-needed book for use in the classroom. If this revision can be carried out, with the viewpoint of the teacher and student in mind, the volume will become a useful addition to the available meteorological textbooks. There are extraordinarily few slips. We note *bogs* for fogs (p. 88); *knwon* for known (p. 93), and that Fig. 6 is upside down.

R. DeC. Ward

Abbot, C. G. **On periodicity in solar variation.** 8 pp. Diagrs. *Smithsonian Misc. Colls.,* Vol. 69, No. 6. Washington, D. C., 1918.

Chapman, S. **An outline of a theory of magnetic storms.** Diagrs. *Proc. Royal Soc.,* No. A 666, Ser. A, Vol. 95, 1918, pp. 61-83. London.

McAdie, Alexander. **Uniformity in aerographic records: The desirability of universal scientific units.** *Scientific American Suppl.,* No. 2244, Vol. 87, 1919, Jan. 4, pp. 15-16.

Paine, G. P. **Report on modes of air motion and the equations of the general circulation of the earth's atmosphere.** Diagrs., bibliogr. *Monthly Weather Rev.,* Vol. 46, 1918, No. 7, pp. 311-323. Washington, D. C.

Shaw, Napier. **The travel of circular depressions and tornadoes and the relation of pressure to wind for circular isobars.** 26 pp.; maps, diagrs. *Geophysical Memoirs No. 12.* Meteorological Office, London, 1918.

Simpson, G. C. **The twelve-hourly barometer oscillation.** Maps, diagrs. *Quart. Journ. Royal Meteorol. Soc.*, No. 185, Vol. 44, 1918, pp. 1-19 (discussion, pp. 18-19). London. [Followed by "A Note on the Propagation of the Semi-Diurnal Pressure Wave" by F. J. W. Whipple, pp. 20-22.]

Ward, R. DeC. **Climate—Considered especially in relation to man.** 2nd edit., revised. xv and 380 pp.; maps, diagrs., bibliogr., index. (Science Series, No. 20.) G. P. Putnam's Sons, New York and London, 1918. $2.00. 8½ x 5½. [In the present new edition of this standard work the chapters on "The Characteristics of the Polar Zones" and on "Change of Climate" have been revised, the former mainly according to Meinardus for the Antarctic, and the latter to take into account Huntington's recent work. Although involving the making of new cuts it might have been advisable to show the Northeast Foreland of Greenland and Nicholas II Land on the three polar charts, Figs. 30, 31, and 32, in order to bring them up to date in their representation of the distribution of land and water. The first edition, 1908, was reviewed in *Bull. Amer. Geogr. Soc.*, Vol. 40, 1908, p. 490.]

HUMAN GEOGRAPHY

Economic Geography

Production

Crookes, William. **The wheat problem.** 3rd edit., with . . . . a chapter on future wheat supplies by R. Henry Rew, and introduction by Lord Rhondda. xvi and 100 pp.; diagrs. Longmans, Green & Co., London, 1917. $1.25. 8 x 5.

In 1898 Sir William Crookes, delivering his presidential address before the British Association for the Advancement of Science, stated the wheat problem thus: "What can the United Kingdom do to be reasonably safe from starvation in presence of two successive failures of the world's wheat harvest, or against a hostile combination of European nations?" Sir William's own contribution towards solution was that "starvation may be averted through the laboratory" and he proceeded to discuss the problem of fixation of atmospheric nitrogen. The pertinence of the entire discussion to the present food situation in Britain led the late food controller, Lord Rhondda, to republish the address in revised form. To the original statement has been added a chapter on recent developments. As Lord Rhondda points out in his introduction, the wheat problem may be solved in two ways—by increasing the acreage or by increasing the yield per acre. Decline of the wheat acreage in Britain and possibilities of extending it are briefly discussed (a full statement of the various factors entering into the problem is given in Hall: Agriculture After the War, New York, 1916). The question of oversea producing areas is looked into without particularly encouraging conclusions as regards the extension of production: "the extension of the wheat-growing area is nearing its limits." In this, however, Sir William is at variance with other authorities. As Lyde points out in an interesting review, "The Real Wheat Question" (*Geogr. Journ.*, Vol. 51, 1918, pp. 325-329), the climatic limits of wheat growing in Canada have not been reached. Canada is the nearest British source of supply, and by this geographer the *real* wheat problem, of the immediate present at least, is regarded as how to insure the Canadian supplies reaching the mother country.

A more optimistic view, however, is expressed in the concluding chapter, "Future Wheat Supplies," by Sir Henry Rew, who considers that the main point in which war conditions throw light on the future problem is "evidence of rapid response of wheat acreage to economic pressure." Furthermore, statistics show that during the decade 1901-11 the acreage of wheat has increased more rapidly than population; and of special interest to Britain is the ratio in the Empire, where the increase in acreage amounted to 45.5 per cent with a population increase of 6.6 per cent.

Sir William's chief contribution in the present as in the earlier editions is that of the chemist. He describes the various processes by which, since the date of his address, atmospheric nitrogen has been fixed on a commercial scale, and gives an interesting table of the imports and exports of synthetic nitrogenous fertilizers from 1913 to 1915.

Arnold, Ralph. **General conditions of the petroleum industry and the world's future supply.** *Bull. Geol. Soc. of Amer.*, Vol. 28, 1917, No. 3, pp. 603-616. [The writer believes that the maximum point of the world's petroleum production (disregarding Africa, an unknown but probably not important factor) will be reached within the ext ten years. The United States, Italy, Galicia, and Germany have attained their axima. Canada and Russia showed maxima some years ago, but it is probable that ew fields will be opened in both countries. In other oil-producing regions production on the increase.]

Davis, A. P. **Irrigation works constructed by the United States government.** vi and 413 pp.; diagrs., ills., index. John Wiley & Sons, Inc., New York, Chapman Hall, Ltd., London, 1917. $4.50. 9 x 6. [Engineering descriptions.]

Fearnsides, W. G. **The shortage of the supply of non-phosphoric iron ore.** laps, diagrs. *Journ. Royal Soc. of Arts,* No. 3384, Vol. 65, 1917, pp. 743-754; No. 385, pp. 757-766; No. 3386, pp. 771-783. London. [Abstracted in the *Review,* Vol. 5, 918, pp. 74-75.]

—— **Proceedings of the Third International Congress of Tropical Agriculure Held at the Imperial Institute, London, June 23rd to 30th, 1914.** xi and 07 pp. Internat. Assoc. for Tropical Agric., and John Bale, Sons & Danielsson, Ltd., ondon, 1914. 10s. 19½ x 6. [Containing abstracts of papers and reports of discusions. The papers read are contained in full in two volumes of "Transactions," pubished later.]

—— **Rice, Production and uses of.** *Bull. Imperial Inst.,* Vol. 15, 1917, No. 2, pp. 98-267. London. [Deals exhaustively with production in British Empire and also ives an excellent summary of production in other countries.]

Roorbach, G. B. **The world's food supply.** 33 pp.; diagrs. Reprint from *Innals Amer. Acad. of Polit. and Soc. Sci. (Publ. No. 1148),* 1917, Nov. Philadelphia.

Sallior, P. **Gisements de potasse nouveaux.** Diagrs. *La Nature,* No. 2304, 917, Nov. 24, pp. 324-326. [Cf. note in the *Review,* Vol. 5, 1918, p. 149.]

Wilcox, E. V. **Tropical agriculture: The climate, soils, cultural methods, rops, live stock, commercial importance, and opportunities of the tropics.** xviii and 372 pp.; ills., bibliogr., index. D. Appleton & Co., New York and London, 1916. 32.50. 8 x 5½.

HISTORY OF GEOGRAPHY AND EXPLORATION

Averdunk, H., and J. Müller-Reinhard. **Gerhard Mercator und die Geographen unter seinen Nachkommen.** viii and 188 pp.; map, diagrs., ills., index. *Ergänzungsheft No. 182 zu Petermanns Mitt.* Justus Perthes, Gotha, 1914. M.14. 10½ x 7½.

This biography, in the main, is the work of the first-named author, the second apparently contributing but two or three chapters relating chiefly to Mercator's globe studies and to his studies in the fields of magnetism and map projection. The *raison d'être* for the publication is stated to be a desire to furnish in the German language a biography of the distinguished geographer for whom, with Breusing, a German nationality is claimed, contrary to the opinion of van Raemdonck, who considered him to be of Flemish origin.

It may be said that the authors have prepared an exceedingly interesting, and for the general purposes of students and readers, an adequate account of the life and work of Mercator. Such information of value as the years have furnished concerning him, since the issue of the van Raemdonck and the Breusing publications, has been duly inserted, notably a reference to the influence now known to have been exerted upon Mercator's early years by Gemma Frisius, whose recently discovered globes give the interesting evidence.

Chapters have been included giving detailed notice of the Gemma globes and also of the globes of Mercator, which exerted an influence very pronounced in globe construction for a period of more than one hundred years.

To each of the distinguished geographer's individual large maps, including his world map of the year 1538—and the authors here perpetuate the now inexcusable error that but one original copy of this is known—his map of the British Isles and of Europe, as well as his all-important world map of the year 1569, consideration is given, though a detailed critical study of neither has been undertaken.

Mercator's letters, so valuable as intimate sources for an understanding of the character of the man, and published by van Raemdonck and van Ortroy, are not reprinted in full in this work; but a running comment on each is presented showing the particular importance attaching to it. The concluding chapters give an account of Mercator's sons and successors who carried on the work he had initiated. Illustrations, to the number of 28 full-page plates (including portraits, title pages, and maps), have been inserted.

E. L. Stevenson

Gallois, L. **Paul Vidal de la Blache.** Ill. *Ann. de Géogr.*, No. 147, Vol. 27, 1918, May 15, pp. 161-173. [An admirable account of the life and work of the late dean of French geographers.]

Isnard, Albert. **Joseph-Nicolas Delisle: Sa biographie et sa collection de cartes géographiques à la Bibliothèque Nationale.** *Bull. Section de Géogr. du Comité des Travaux Hist. et Sci.*, Vol. 30, 1915, pp. 34-168. Paris, 1916.

Keltie, J. S. **A half-century of geographical progress.** Maps. *Scottish Geogr. Mag.*, Vol. 31, 1915, No. 12, pp. 617-636. [Abstracted in the *Review*, Vol. 2, 1916, pp. 306-307.]

Keltie, J. S. **Thirty years' work of the Royal Geographical Society.** *Geogr. Journ.*, Vol. 49, 1917, No. 5, pp. 350-376 (discussion, pp. 373-376).

Lulofs, H. J. **Geographie in den spiegel der oudheid (Polybius, Strabo, Cl. Ptolemaeus, Eustathius).** Bibliogr. *Tijdschr. Kon. Nederl. Aardrijk. Genoot.*, Vol. 34, 1917, No. 6, pp. 822-852; Vol. 35, 1918, No. 1, pp. 20-52.

Margerie, Emmanuel de. **La géologie.** Ill., bibliogr. *La Science Française*, Vol. 1, pp. 201-264. (Exposition universelle et internationale de San Francisco.) Librairie Larousse, Paris, 1915. 9 x 6. [An account of France's contribution to geological science.]

—— **Margerie, Emmanuel de, Notice sur les travaux scientifiques (géographie et géologie) publiés par, de 1882 a 1917.** 68 pp. Gauthier-Villars et Cie., Paris, 1917. 11 x 9.

Marinelli, Olinto. **Lo stretto di Anian e Giacomo Gastaldi.** Map. *Riv. Geogr. Italiana*, Vol. 24, 1917, No. 1-2, pp. 39-49. Florence.

Merino, Abelardo. **Estudios histórico-críticos sobre Magellanes.** Ill. *Bol. Real Soc. Geogr.*, Vol. 59, 1917, No. 4, pp. 500-536. Madrid.

Ricchieri, Giuseppe. **La geografia al Congresso della Società Italiana per il Progresso delle Scienze (Milano-Torino 2-7 Aprile).** *Riv. Geogr. Italiana*, Vol. 24, 1917, No. 5, pp. 181-186. Florence.

Smith, G. E. **Ancient mariners.** Map, ills. *Rept. and Proc. Belfast Nat. Hist. and Philos. Soc., Session 1916-17*, pp. 44-72. Belfast, 1918. [Early maritime intercourse and the part it has played in the diffusion of civilization. See also *Journ. Manchester Geogr. Soc.*, Vol. 33, 1917, Parts I-IV, pp. 1-22.]

T[homson], J. A. **Alexander McKay.** Ill. *Trans. and Proc. New Zealand Inst.*, Vol. 50, 1918, pp. vii-viii. Wellington. [This volume contains a short biographical sketch of Alexander McKay, late Government Geologist of New Zealand, whose geological explorations covered almost the entire area of New Zealand and whose writings form the only source of information regarding many parts of the islands.]

Vignaud, Henry. **Americ Vespuce, 1451-1512: Sa biographie, sa vie, ses voyages, ses découvertes, l'attribution de son nom a l'Amérique, ses relations authentiques et contestées.** ix and 421 pp.; index. (Recueil de Voyages et de Documents pour servir a l'histoire de la géographie.) Ernest Leroux, Paris, 1917.

Watson, Foster. **Richard Hakluyt: A pioneer of colonisation.** *United Empire*, Vol. 8 (N. S.), 1917, No. 4, pp. 225-238 (discussion, pp. 237-238).

THE
GEOGRAPHICAL REVIEW

VOL. VII APRIL, 1919 No. 4

PRINCIPLES IN THE DETERMINATION OF BOUNDARIES*

By ALBERT PERRY BRIGHAM
Colgate University

Three Stages of Civilization

THE TRIBAL STAGE

The student of boundaries must take account of a threefold evolution, marking a primitive, or tribal, stage, in which such lines do not exist; a mixed, or transitional, stage, in which demarcations are shifting but gradually embrace all regions of the world; and a third, or ideal, stage, in which they become in great part fixed and at the same time of diminished importance save for convenience of administration. We are now in the second stage, and some would deny that the third condition can ever become effective.

In the hunter-nomadic type of world economy there is room enough; tribes grow up in their own centers, with more or less clash in their wanderings; but frontier problems do not press, and the limits of ownership are vague. Such boundaries as existed in early times were without plan or consciousness on the part of the groups that were separated. The world was comparatively empty. Groups expanded in regions where hunting, fishing, pasture, and simple tillage were favored. Over the mountain ridge, beyond a belt of desert, or across a lake or salt sea were other assemblages of men. There were no maps, no surveys, and no boundary lines; there were only separating zones. As put by Professor Lyde, the frontier was the farthest region from which the tribe could get food.[1] It was the domain of self-sufficiency for an embryo nation.

Another English writer sees a vivid picture of the hunter expanding his radius, meeting others expanding their radii and becoming man hunters, the ancestors of the warrior nobles of the Middle Ages and of the Renais-

---

* Read at the fourteenth annual meeting of the Association of American Geographers, Baltimore, December 27-28, 1918.

[1] L. W. Lyde: Types of Political Frontiers in Europe, *Geogr. Journ.*, Vol. 45, 1915, pp. 126-145.

Copyright, 1919, by the American Geographical Society of New York

sance, down to the imperialists of the present day.[2] In the war from which we have now passed is evidence that primitive conditions have kept a stubborn grip on a changing world.

THE TRANSITIONAL STAGE

The second stage shows developed civilizations and high densities of population in large parts of the world, with primitive or semi-civilized peoples elsewhere. Frontiers of the modern and definite kind abound in more advanced regions, which shade off into penumbras of spheres of interest, spheres of influence, protectorates, and buffer states. In so far as less-developed lands are held as colonial property, as in Africa, demarcations are as essential as in Europe.

Boundaries as we know them, as the schoolboy learns them, strict lines of separation, are therefore features of maturing civilization, with growing densities and increasing pressure on natural resources. They have in the past been commonly put as far out from the center of the group or nation concerned as its numbers and needs required, or as far as the ambitions and the power of its rulers made possible. During many centuries boundaries have been laid down in treaties, and treaties have been, in the main, the expression of power, power to get and power to prevent an enemy from getting.

THE IDEAL STAGE

The final stage, to which we look, offers a world full of autonomous nations, all fitted for self-government and fitted to live in amity with their neighbors to mutual profit. Self-restraint as a mark of national policy is a development of our own times. Nations are learning the futility of Alsace-Lorraine experiments in boundary shifting. Many boundary disputes which in earlier times would have been settled by conflict have in the last hundred years been peacefully adjudicated.

We are approaching, or we should like to think we are approaching, the time when national limits are to be set for equal welfare on both sides of the line, when considerations of defense and of aggression fall out of sight, and justice is the only goal—justice involving the administrative convenience, reasonable self-sufficiency, and economic co-operation of national groups. So far as this ideal is reached, a line across a plain may be as good as a mountain range, the forty-ninth parallel as useful as the Pyrenees. Under such ideal conditions international lines would be little more than our bounds of states, counties, and towns—they tell us where to vote, where to pay our taxes and record our mortgages, and who will build roads for us, police us, and otherwise carry out our will in the various spheres of government. As state and civic pride still abounds, we need not fear that patriotism will die.

---

[2] Patrick Geddes: Boundaries and Frontiers, *Westminster Rev.*, Vol. 169, 1908, pp. 257-260; reference on p. 257.

Thus we meet the question of today: How far have we passed out of the tooth-and-claw stage of human relations? Have we even touched a dim, outer zone of the millennium? If victory had rested with the enemy we well know on what principles boundaries would have been drawn. Victory being where it is, just and rational boundaries, we may safely hope, will safeguard peace in our time. Here, then, is our point of departure for a summary of the principles which control the fixing of boundary lines.

Two Opposing Theories of Boundaries

Two opposing types of view have been set forth by British geographers during the past four years. These authorities are Colonel Sir Thomas Holdich and Professor L. W. Lyde, and their conclusions are developed in several published volumes and in a series of essays appearing in the *Geographical Journal*, the *Scottish Geographical Magazine*, and the *Nineteenth Century*.

HOLDICH'S VIEW: THE DEFENSIVE FUNCTION OF BOUNDARIES

Sir Thomas Holdich is recognized as pre-eminent among those who have had actual and long experience in boundary demarcation. He is a soldier and represents distinctly the military and defensive conception of the function of boundaries. It is his deep and unalterable conviction that signs of international good will are not frequent enough to warrant boundary fixing "which would lead to the mingling together of the human fringes of the nations."[3] But if the fringes are already entangled we are at liberty to ask what we can do about it. It is indeed fair to remind ourselves at this point that Holdich is contesting Lyde's view that boundaries should of set purpose be put where population is dense and where people are forced to meet one another. Man being "a fighting animal, he must be prevented from physical interference with his neighbor by physical means. . . . A boundary must be a barrier." Ergo, if there be no barrier, we must rely on armament and fighting—a rather hopeless outlook. Yet Holdich admits the need of considering *first* the sentimental values in a boundary dispute; but he returns—and who, after England's four years, will wonder?—to the conclusion that "security means armament," an artificial protection if no natural defense is possible. No rosy hopes of millenniums should blot out the lesson of tears and blood. Of all barriers, mountains are "incomparably the best." Holdich often recurs to the Himalayas and the Andes, but most of the world, and most of the people of the world, are not on the two sides of the Andes or the Himalayas; and the Alps, the Carpathians, and the Pyrenees fall far short of supplying high fences for Europe's dense and diverse millions. Failing high mountains, Holdich comes to common divides and water partings. These indeed are determinable and, for human periods, reasonably stable; but are they defensive?

---

[3] T. H. Holdich: Political Boundaries, *Scottish Geogr. Mag.*, Vol. 32, 1916, pp. 497-507.

Recognizing that small elevations are more common than Pyrenees, our author reverts to the defensive value of hills, supplemented by forts and trenches, and thus practically surrenders his major contention for natural ring fences and falls back upon the primitive method of keeping the world in some kind of order. These admissions are hardly consistent with the opinion that "there are but few wide spaces existing in the world where some adaptable features of natural topography are not to be found ready to his (the boundary maker's) hand." On the other hand, one may freely ask where, in the thousands of miles of Eurasian plain that stretch from the Pyrenees to Vladivostok, can a boundary expert trace around any nation "a sound, defensible line" within which it "may find peace and security." We may well fear that a doctrine of natural encirclements will delude us with empty hope; and, in default of international good will, send us along the rough road of recurrent war and patched-up peace.

Lyde's Theory of Assimilative Boundaries

Professor Lyde approaches the subject from the point of view of the human geographer and brings to bear upon it his wide knowledge of the historical, racial, linguistic, and economic relations of human groups. Nowhere are his views more compactly expounded than in his essay on "River Frontiers in Europe."[4] He refers to Holdich's then recent paper before the British Association as setting forth a purely military doctrine of frontiers, as if war were the normal state of man. If a mountain barrier is far better than all others, then a boundary is good, not as it promotes, but as it prevents intercourse. A boundary must on the other hand be an international feature; it must be obvious, indisputable, a promoter of relations in peace and a barrier in war. Lyde cites the Plate, long a frontier line but never a source of friction as regards the countries bordering it. Civilization is "progress in the art of living together," and the world long ago became an economic unit. It is the navigable river which encourages "a maximum of peaceful tendencies." As to the defensive value of rivers, the case of the Danube is cited as having defended Belgrade for four months, in 1914, in the second Austrian attack. It is of course easy to remind ourselves of what happened to Belgrade at a later stage of the war. Many rivers of Russia are cited as having protected the great retreat, especially those rivers which had no marshy bordering plains but did have parallel railways behind them, a combination which "gives a defensive position of enormous strength." Such a barrier may be as good as a mountain range, especially as mountains often have an arc form or a steeper front on one side than on the other, thus destroying the defensive equilibrium as between the two sides. Mountains having failed to keep enemies apart in the sad past, why put large faith in them now?

Rivers favor cultural and linguistic assimilation and the incoming of outside ideas and of international tendencies. ''We *want* the two nations to be unified in all except political allegiance.'' The frontier embodies a formal contract which commercial communities, common on rivers, are more likely to respect than are nomad highlanders. Lyde's closing sentence in this paper has the tone of prophetic warning. ''If the new map of Europe is based on purely military lines, Europe will have to expiate it—once more—on purely military lines.''

---

[4] *Scottish Geogr. Mag.*, Vol. 32, 1916, pp. 545-555.

Such are the alternatives offered. On the one hand nations may not trust each other and must have defensible borders. Such defenses are hard to find and, when found, must be supplemented by artificial constructions and armies. All being done, the best defensive arrangements are likely to be neutralized by destructive modern invention. On the other hand is the hope, more or less theoretical and academic, promulgated by a university professor, that nations will live together in reasonable amity, assimilating themselves to each other, preferably across the narrow waters of a river.

Physical Geography and "Scientific Boundaries"

Those who follow Holdich make much use of the phrase ''scientific boundaries.'' We may inquire whether there are such boundaries, seeking thus to know what the words really mean. We suppose natural features are intended, which man seizes for his purpose; and this purpose is assumed to be division and to involve separation and defensibility, as viewed from both sides. There are four commonly recognized kinds: mountains and water partings in general; deserts; seas; and rivers. Of all these we may say that they show infinite diversity, irregularity, and confusion in magnitude and in form and that they offer a limited assortment of sharply defined, unmistakable, and unchanging divisions.

Mountains

Mountain ranges do not commonly offer single, commanding ridges, but break into components running in rough parallelism, or at various angles, with intricate and sometimes elaborately trellised systems of drainage, developing on maturing mountain fields of the Appalachian type. The Jura, lying between France and Switzerland, is a pertinent example. Water partings are far from meeting elementary notions of rooflike separation and show vague cols joining the opposite slopes of a plateau, or the uncertain and shifting sources of streams in vast glacial marshes.

Deserts

Perhaps the best historic example of desert boundaries is found in Egypt. Here for thousands of years was a densely peopled area, shut off on three sides by an arid wilderness and on a fourth by a sea which knew no developed art of navigation. Yet Egypt managed to fight and to be fought, in spite of her natural seclusion. Now we carry millions of soldiers in ships, run a railway across the Sinaitic desert, and mark the aërial passage of a schoolmaster from the Holy Land to the Nile in fewer hours than it took decades for the Hebrews to go in the opposite direction. The near future holds railways across the Sahara and over the arid wastes of Australia, while express trains have long crossed the Great American Desert from the Rio Grande to the Saskatchewan.

SEAS

Seas have been regarded as efficient boundaries of the "scientific" order. The American red man was long safe from pale-faced conquerors through the fending power of the Atlantic; but Roman and Carthaginian were getting marine practice in effective military crossings of the Mediterranean, and the Strait of Gibraltar did not save the Iberian Peninsula from centuries of African rule. America now yields her claim to isolation as never before in her history and is beginning to recognize that the jingo myths of some American school histories, rather than the Atlantic Ocean, separated the United States from the mother country.

RIVERS

Under the influence of the old, defensive ideals, geographers have not thought that rivers were good boundaries. People on the opposite slopes and flood plains of a river valley tend to meet and to engage in like activities. A river is indeed a military obstacle, and armies have sacrificed thousands of men in the present war in seizing bridgeheads necessary to their advance. George has pointed out that a river is always a weak spot in the communications of an invading army.[5] One does not quite understand Lyde's contention that a river backed by a railroad is a strong defense, in view of the range and power of the artillery which may be assembled on the opposite bank. Other objections to rivers as international borders offer themselves. Some rivers disappear seasonally, or they shift their courses, or their waters are withdrawn for irrigation. Public works of large variety belong to river courses, and the people of both banks must be equally interested in their control. Water rights must be established in relation to domestic supply, pollution, industrial power, and navigation. Bridges, cables, and ferries are to be added to the catalogue of a river's belongings. All these things involve and imply intimate and friendly relations.

But, however we urge the limitations of rivers, we cannot rule them out if assimilative boundaries are to have significance in the future. Indeed, if we go back to the defensive idea, we must still use rivers in Europe, because they have some value and are far more numerous and available as dividers than any other class of natural features.

---

[5] H. B. George: The Relations of Geography and History, Oxford, 1901, p. 30.

Niagara Falls, a name marking two communities, one in Canada and the other in the United States, is an example of several of the problems named above, and it may be urged that they have been amicably solved. But the forty-ninth parallel has been as good a divide as Niagara River or the Great Lakes, and the same reason may be affirmed in relation to both—a decently disposed people lived on each side of the line.

Lakes are related to rivers as they are to seas, when viewed as boundaries. Marshes offer a belt, like the desert. They are like the desert in being hard to cross; but they present a different sort of difficulty in crossing and in some future time may be reclaimed, deforested, and provided with roads.

World Survey of Physical Boundaries

THE AMERICAS

Light is thrown on our problem by the most cursory inspection of the world map. The northern boundary of the United States begins in the east with the ragged outline of Maine, which projects far north into the basin of the St. Lawrence River and historically represents geographic ignorance, was settled by a series of painful negotiations, and violates all notions of a scientific boundary. The line through the upper St. Lawrence and the Great Lakes is a natural line until the north shore of Lake Superior is reached, where it leads off through a tangle of lakes and marshes to the Lake of the Woods. Thence the forty-ninth parallel is used, and we have the authority of Holdich for the badness of straight lines, as being expensive to determine and mark and as paying no heed to topography or human choice.

The last objection has little value here, since the line was originally run through an uninhabited region. The first objection has this support, that the line as marked diverges in places as much as 2,000 feet from the astronomical position.

The southern Alaskan frontier is cast through a tangle of high mountains and is widely held to be unjust to Canada, in that it shuts off an enormous Canadian hinterland from direct access to the sea. Sufficient reference has already been made to the Rio Grande, and the remainder of the Mexican boundary is wholly arbitrary. North America is assuredly poor in boundaries of military or separative value.

The same is to be said on the whole of South America. Brazil is bordered by ten political units, of which seven are autonomous nations and three are colonial possessions governed from Europe. On the side of the three colonies the line follows the water parting. Sections of rivers form part of the lines toward Paraguay and Uruguay. We think of Brazil as the country of the Amazon, yet vast areas of Colombia, Ecuador, Peru, and Bolivia reach over into the mazes of the Amazon forest.

The southern stretch of the Andes nearly led Chile and Argentina into a boundary war, which was averted by reference to a British commission, of which Sir Thomas Holdich was a member. The line was by treaty to follow the heights of the range. Investigation in an unmapped region showed that the water partings were well eastward of the line of main crests. Hence the problem; the solution kept the peace but is in no way scientific. If we follow the view that rivers are not desirable as boundaries, then the middle Andes, shutting off northern Argentina from northern Chile, are the only good international boundary in South America.

AFRICA AND ASIA

Africa tells the same story, if possible in stronger fashion. Because the continent has little in the way of sustained mountain ranges and is bordered by a smooth shore line, the available features are rivers, lakes, and deserts. The greatest African rivers function to a small degree in this field; the Niger not at all, the Nile but slightly, the main stream of the Congo only in a part of its lower course. The Zambezi, Limpopo, Vaal, and Orange Rivers serve only as between British dependencies, assuming that German Southwest Africa will pass to permanent British control. The great African lakes play a part comparable, in the future it may be, to the international functions of our own Great Lakes. Egypt has already been considered. No African country can rest its security upon physical boundaries.

Before we come to Europe, there remains Asia. Asia, in the large, is a central highland with a lowland fringe. Central Asia is a barrier in itself, mountain and lofty plateau, deserts of rock and snow, deserts of aridity. Northern India, on the southern edge of this great core, has, in the separatist view, the finest boundary in the world, yet nowhere has British nervousness been more fully exhibited, and nowhere have we such an outfit of spheres of influence, protectorates, and buffer states as here.

The Amur, the Mekong, and the upper Oxus are the main examples of river boundaries. Recent history is sufficient commentary on the physical security of Manchuria, with Russian influence reaching across a great river and Japan seeking protection and grasping for power across the sea. The plains of Mesopotamia are shut off from the world by deserts and mountains, and they have been the football of military powers from the dawn of history to the twentieth century. Writers upon Palestine divide their emphasis between the isolation of the little land and its historic place on the highroads that for thousands of years have joined three continents. It is a long way from the armies of Assyria and Egypt to the crusades and the British victories of the past year.

Historical Survey of Physical Boundaries in Europe

So far the map does not speak loudly for the protective value of scientific boundaries. We pass to observe the type examples of Europe. Here, f anywhere, we shall find demonstrative evidence that physical features re in high degree divisive and defensive.

The Pyrenees

"In Europe the Pyrenees form perhaps the most typical example of an ffective mountain barrier . . . . they stand as they have stood for ages s the parting line between two Latin nations which so far have shown no endency towards mutual assimilation or desire for cultural unity." This s the judgment of Holdich;[6] but the facts are not historically so simple as ere asserted. Not taking account of earlier Phenician, Greek, and Carthaginian interests, the Iberian Peninsula, save for a brief Frankish invasion, vas all under Roman sway down to the first barbarian incursion about 00 A.D. Since that time the peninsula, with a clean boundary on the crest f the Pyrenees, has been under one sovereignty only for a period of about alf a century. During the invasions there was a Visigothic kingdom which xtended far over the Pyrenees and generally reached to the Rhone valley. bout 600 A.D. the range formed a clear boundary between the Frankish nd the Visigothic kingdoms, but half a century later the Visigothic sovereignty again approximated the Rhone delta.

The Saracen attempt to bestride the Pyrenees was less successful, but even he blow dealt by Charles Martel at Tours did not end the Moslem ambition to get a foothold north of the mountains. Charlemagne held the panish March, and, as he came to his end, his strong hand reached across he Pyrenees as far as Barcelona and a stretch of the upper Ebro. At the ime of the First Crusade, 1100 A.D., Navarre and Aragon were small tates along the range, and the Kingdom of France included the Mediterranean shore line as far as Barcelona. In the fourteenth century the Pyrenees ecame the essential boundary, but there were minor fluctuations until the niddle of the seventeenth century. It is to the purpose to observe that Napoleon put a large army into Spain and was baffled of his aim not by the 'scientific" wall of the Pyrenees but by the fires of European resentment vhich determined to crush him and free the world from the menace of universal dominion. The human spirit rose, as it has risen today, and dwarfed ll physical conditions.

The Alps

Granting that the Pyrenees are one of the best of protective boundaries, he Alps confessedly offer poor support to this type of view. This is widely recognized. "The Alps have not isolated like the Pyrenees."[7] "It was he fashion in Roman times to speak of the Alps as the rampart of Italy. They have at all times proved a singularly ineffectual one . . . Goths and Huns, Lombards and Franks, Holy Roman Emperors, French Kings, Napoleonic and Austrian armies have swarmed over their ridges. The Alpine passes have served as the neck of an hourglass; the human sand runs through them easily either way.''[8] To the same purpose Dominian quotes the lines of Cowper—

---

[6] T. H. Holdich: Political Frontiers and Boundary Making, London, 1916, p. 150.

[7] L. W. Lyde, article cited in footnote 1, p. 130.

> Mountains interposed
> Make enemies of nations who had else
> Like kindred drops been mingled into one

and observes that ''the passes of the Alps refute the poet's statement. Their uniting functions eventually overcame their estranging power.''[9] Popular notions emphasize the unity and physical aloofness of Italy, shut into her peninsula and fended from icy winds by her towering Alps. Yet Italy has fought a bloody war to free herself from the threat of Trentino and the menace of natural naval fortresses on the farther side of the Adriatic Sea. The history of two thousand years does not here lend much support to the barrier theory.

The Alps were crossed by the armies of Hannibal, and the conquests of Caesar and his successors wiped them out as a barrier. Odoacer, a German barbarian, established in 476 a kingdom astride the Alps reaching from Sicily nearly to the Danube. The Ostrogoths overthrew Odoacer and still more completely ignored the mountains, pushing their frontier to the south bank of the Danube. The Lombards, also German in race, next occupied the Alps and pushed their sway almost to the end of the peninsula. Charlemagne's empire reached from the North Sea beyond Rome. The First Crusade saw the empire equally extended in the south. By 1360, when the empire was much broken, it still reached over a part of the Alpine range as far as Tuscany. In 1549 the Swiss Confederation took its place among the mountain heights, whence it has never been dislodged. In Napoleon's time it became a part of the Confederation of the Rhine but came forth in the reconstruction of Europe in 1815, never, we may hope, to be thrown down from its high seat.

Thus the great range has never been a boundary in the strict sense of delimiting two nations which came up to either of its great lines of water parting. If we examine the Alps today we find them as an ideal boundary only between France and Italy. Switzerland occupies the central heights without unity of race or language. It thrusts a tongue southward among the Italian lakes without a shadow of geographic reason and projects into French territory past Lake Geneva in equally arbitrary fashion. In like manner it cuts off the upper waters of the Rhine and joins Austria along a meaningless frontier. Lyde avers that it is ''too strong by natural features and human type for any of its neighbors to be permanently dangerous to it.''[10] One may question this assurance and may well doubt whether the considerations cited fully explain the German failure to cross Swiss territory. At all events Switzerland for a short section of the Alps fills the rôle of a buffer state. The Italian struggle with Austria will result in making the great mountain arc more nearly a precise boundary than it ever has been in the course of European history.

---

[8] D. W. Freshfield: The Great Passes of the Western and Central Alps, *Geogr. Journ.*, Vol. 49, 1917, pp. 2-26; reference on p. 5.

[9] Leon Dominian: The Frontiers of Language and Nationality in Europe, New York, 1917, p. 333.

[10] Article cited in footnote 1, p. 134.

THE ENGLISH CHANNEL AND THE NORTH SEA

One might hold, with large show of reason, that the English Channel has been the most effective of all historic boundaries. It has undergone the test of centuries, and the island kingdom stands forth needing no argument. Before we pass to particulars, we may summarize our conclusion by asking if there would have been immunity from invasion in all modern times if we could imagine an interchange of population types between Great Britain (in the strict meaning of the term) and Ireland. In this manner we inquire concerning the relative protective value of the national spirit and the geographic situation. We shall make no pretense to a quantitative answer, for here comes in geographic influence, which has no doubt had its share in molding the nations to defensive strength.

The English Channel and the North Sea (the latter hardly now to be called the German Ocean) did not prevent the Romans from invading and organizing the larger part of the greater island. They were ineffective barriers for centuries against the thieving pirates and tough-handed immigrants who rocked across the waters from the German coast lands, from Jutland, and from the Norwegian fiords, to become the heralded ancestors of Englishmen and New Englishmen. England was successfully invaded in 1066 but never since that remote time. Here we seem to belie our observation that boundaries were specially efficient in primitive days.

Let us come back to the power of environment and, using Lyde's phrase, recognize in the British water frontier a "racial agent," a force or, better, a condition, which helped to make and weld and develop a people, truly a world power. Here were a climate, a soil, a fishing zone, an outfit of minerals, and a defensive water barrier, which encouraged and protected development. Being in the realm of human geography, with emphasis on the human, we put with environment a fortunate gathering of the raw material of civilization, the marauding Angle, Saxon, Dane, and Viking, Teutonic if we must admit it, but as far today from the Teutonic evolution of the Continent as if the Straits of Dover were the Atlantic Ocean.

Here have grown industry, invention, national unity, and the love and power of liberty. As a sea barrier has promoted these ends it may be said to have been efficient in defense; however it be, the kingdom has stood free from the foul clutch of the invader for eight hundred and fifty years because in defensive power, centering in the human spirit, she has more than stood even with any power of aggression.

Our conclusion thus far is that defensive boundaries, as observed in history and as seen in a regional survey of the world today, are few, even in the most highly differentiated regions of all, the continent of Europe. And the few boundaries of distinct efficiency show such limitations that we have no warrant for reliance on them in present settlements or for future generations.

Human Factors in Boundary Making

RACE

Emphasis lies today on the human factors in boundary making. The word ''race'' has been much used in this field but deserves to be discarded. All the great nations and many of the smaller are composite in origin, and it is the nation—not the race—that is looking for ring fences. The German may be Teuton, Slav, or Alpine; long head, round head, brunet, or blond; he is a member, for boundary purposes, not of a race, but of a nation. South Germany has been deemed by good authority to be less Teutonic than eastern France.

LANGUAGE

Nor is language a criterion for the boundary maker. Professor Spenser Wilkinson, in discussing Lyde's paper on boundaries before the Royal Geographical Society, recalled a Greek lady who, in the course of a day's travel in the Balkans, denied that Bulgarian speech necessarily made the speaker Bulgarian. Greeks some of them were in all but speech—''the test of nationality is the will of each.'' Nationality is the criterion, and men may elect their nationality just as they choose the town they will live in and the business they will pursue. Belgium, bilingual; Switzerland, quadrilingual; and Alsace-Lorraine, with French sympathy and German speech, are examples which in these days need but to be named.

NATIONALITY

Nationality means unity of ideal, derived chiefly from hereditary experience or from geographical environment or more often perhaps from both combined. It is the group which wishes to live and act together and to have a common government, embodying its purpose and its emotion in the word patriotism. National feeling is tied up with primitive heroism, or the sage wisdom of the fathers, which preserved the group from destruction; it embodies itself in song and folklore. These heritages gather about sacred pieces of ground, the altar spots of the homeland, and they build themselves into constitutions and laws, into literature, into social customs, distinctive dress, and forms of art. With these cherished things go too often an unreasoning isolation and an absurd and dangerous repugnance to the foreigner and his ways. ''The men who compose a single nation must think together.'' ''Belgium is fathomed in their hearts.'' ''Serbia extends as far as her folk songs are heard.'' Thus, with poetic feeling, does Dominian compress into terse sentences the essence of nationality. A nation, then, is a group loving its own soil, devoted to its ways of living, proud of its history, sure of its destiny. A home, a life, and the will to live and to die if need be in order to preserve them—such is nationality.

Expansion of Prolific Peoples

Nations grow, and in the expansion of prolific peoples the boundary maker meets his most stubborn problem. It has been solved by force; but the world that is, and that is to be, will not willingly meet the question in that way. Human distribution follows to a degree the analogies of biology. Men spread like oysters, chestnuts, fishes, and birds, into environments that favor comfort and perpetuate their kind. The principles of migration, struggle, and adjustment find application in human history. Human groups cannot be put into tight compartments any more successfully than can other creatures. The great northern forest of North America projects a peninsula of its own species far south on the crest of the Appalachians. The Pacific Coast forest has a great enclave among the typical forests of the Canadian Rockies, and all types of forest shade into one another. Such is the distribution of all faunas and floras, fossil and living. So much is to be said for man in his relation to other living things; we inherit an evolutionary condition. Must we therefore apply the law of the jungle to civilization? A great nation, basing its science, as it based its history, its philosophy, and its religion, on its desires, decided that war is a "biological necessity." It fought to get room for increasing numbers. Even Sir Thomas Holdich admits that boundaries are violated by an "irrepressible demand for more space for an expanding people."[11] Can the world admit this procedure? We recognize it in the case of small or primitive populations, as in early America, but what are its limitations among civilized peoples? Must a high birth rate be regarded as giving title to a neighbor's estates? Again Holdich refers to the "right of expansion" to meet the imperious demand of multiplying people as promotive of dispute and war as long as the world lasts. This surely is a hard saying. We cannot indeed expect to regulate population output by an international convention, but perhaps we can regulate international conduct for peoples who convert their domain into a human stock farm. Even Dominian allows that the *Drang nach Osten* is inevitable, because the East is thinly populated and fertile. But this does not answer the question whether the penetration should be imperial and militaristic, or individual and peaceful. If the world is to exist, and if invention is not to proceed to the self-destruction of the race, we must find peaceful ways of caring for growing populations. We cannot pull up line fences while our neighbors sleep and then kill them for resisting in the morning. No writer has put this imperative of the future better than Professor Lyde.

---

[11] Article cited in footnote 3.

"The natural growth of the national unit justifies geographical expansion only in primitive times and places. Even so, as all empty spaces must some day be fully occupied, territorial expansion is only a temporary means of shirking obligations. Certainly in a mature civilization natural growth can be legitimately met only by intensive, not by extensive development—at all events inside that area of mature civilization."[12]

Expansion Through Greed and Ambition

Economic greed and dynastic ambition have used the common human passion for bigness as an argument for territorial expansion. Let us conquer and add territory. We need rich colonial possessions that we may have raw materials and enlarge our markets. It is for the economist to formulate the answer, and it would be significant in boundary determinations. As recognized by more and more of the world at this time, the true end of nations and governments is the well-being of the individual. Is the economic position of a small nation in a decent world worse than that of a great nation? And does the individual man, or the special industry, have as good a chance in a small as in a large nation? If there is, or can be, equal opportunity to realize the true ends of life, a strong motive for tearing up boundaries is put to rest.

We do not attempt the answer. We may, however, observe that the Swiss seem as happy and prosperous, by all decent standards, as British, French, or Americans. The quality of loyalty is not set by the bigness of one's country, rather in the love of its institutions, devotion to its physical associations, pride in its achievements, and satisfaction in the comfort and opportunity which it offers. It may be, after all, that the meek shall inherit the earth—a German today may well envy a Dane or even a Cuban.

Losses by Emigration

Here belongs the alleged loss of the emigrant who goes out from the homeland and naturalizes himself under another flag. Out of this view which regards alienation as a subtraction from the legitimate resources of a nation, arise propaganda, espionage, mental reservation, double allegiance, that ugly brood of policies devised to build up *Deutschtum* in America, colonies in South America, and extension of dominion everywhere. Which would have been a greater boon to Germany—a large body of emigrants becoming loyal Brazilian citizens, retaining kindly memories of the Fatherland, and fostering friendly trade; or a collection of aliens maintaining a solid block of language, drilling at arms and plotting to put a blotch of German color on the map of the southern continent? Britons have gone to the United States, to Canada, to Australia, to South Africa, with godspeeds and no grudging, with consequences to the motherland now self-revealed and glorious. A seed of personality, of industry, thrift, and liberty blown on the wind of chance and rooted in the farthest corner of the world does not make the home country poor. When the world learns the lesson of mutuality it will have cleared the worst tangles in its boundary problems.

---

[12] L. W. Lyde: Some Frontiers of Tomorrow, London, 1915, p. 12.

Boundaries for Economic Equilibrium

There is a school of writers who base their conclusions on a so-called economic interpretation of history and call for countries outlined as natural economic units having a considerable degree of self-sufficiency in resources and trade opportunities. In their view small nations do not much count if they stand in the way of big neighbors. Mr. Simon N. Patten, of the University of Pennsylvania, is an apostle of this doctrine. His views of the “unnatural boundaries of European states” and of a scheme of reconstruction can best be told in his own language, which even in excerpts appears to do him no injustice. “Old tradition persists, and ideas of political freedom based on former conditions demand small states. Economic progress, however, makes larger states inevitable now that the world's resources are to be exploited in more effective ways.” We are forced to conclude that former conditions, home, traditions, constitutions, customs, patriotism, count for nothing and that man ought to live by bread alone. “Germans sacrifice so much for their country because they see an even more degraded Germany looming up as a result of defeat.” “Germany is admittedly in a position where her present boundaries act as a hindrance to her industrial development and a bar to her social progress. Her natural seaports are in Holland and Belgium.” “Shall race feeling or economic interest dictate the formation of boundaries?” “Germany suffers a similar wrong when she is kept from the North Sea and a permanent commercial union with Holland and North Belgium.” “The masses of the people would grow more contented as their prosperity and security were assured, and would soon become callous to those reactionary appeals to the emotions that now make so much trouble for the world.” “Scientific boundaries could easily be arranged that would bind together the people within them and make these inhabitants generous and sympathetic to those outside of them. Moreover such zone boundaries are easy to draw in Europe, as the natural features that fix them are so pronounced.” “Belgium is an artificial state created out of the whole cloth with no regard to social or economic consideration. Only a false enthusiasm for small political units gives any ground for its continuation.”[13] Of the above sentiments, a geographer has only this to say: that they represent an alleged principle of boundary making; that social philosophers have missed the recipe for making men good and contented; and that further criticism either from the social or the geographic point of view is unnecessary.

---

[13] Unnatural Boundaries of European States, *Survey*, Vol. 34, 1915, pp. 24-32.

Present problems are an inheritance from the migrations, expansion, and conquests of the historic past, and the new map cannot be beaten into conformity with abstract theories. Making up countries by rule is as impracticable as any radical socialist program for individual prosperity.

Specific Problems of Europe

It is not within the scope of this article to discuss, beyond bare reference, the new map of Europe. Map makers, however, must take account of the principles which we have attempted to place in order. Certain applications of these principles may be briefly examined. The author has made it clear that with certain reservations he is more in sympathy with the Lyde type of doctrine than with that so ably urged by Holdich. With modern appliances for aggression, the world must put its faith in the decent behavior of nations; but the nations must for a time, and perhaps for a long time, be prepared to supplement this faith by co-operative militant action. It is pessimistic and unthinkable to settle down to the Prussian principle of world order.

France

The simplest survey of the map of France shows the futility of the ring fence as a safeguard of her liberty. She is bordered by four seas and cannot defend herself, unassociated, from any pirate navy that is permitted to roam them. It is no violent hypothesis that Swiss neutrality should have been violated and that Italy should have been forced into military co-operation as a member of the Triple Alliance. In the light of such possibilities examine the French east front. The Belgian plain, protected by treaty and by the forts of Liège, have their own story. The Verdun gap was held by the blood of Frenchmen. There would still have been open the Belfort gap, the Geneva-Rhone route, the passes of the Savoyan Alps, and the coast gate of the Riviera. It is idle to talk of the Ardennes, the Vosges, the Alps, the Pyrenees, and the sea as protecting France. One of the most eminent of French geographers has said, speaking of the land border, that his country was "encircled but not imprisoned." He might have said "surrounded but not protected."

Poland

Even worse is the barrier theory for the new Poland. This unhappy country appears on the map at least as early as the time of the First Crusade, bordered by Pomerania, Bohemia, Hungary, and Russia. Then the Carpathians were its southern boundary. Similar was the status two centuries later with even longer frontage on the Carpathians. There was vast extension in the sixteenth century when Poland came to the Baltic between Pomerania and the Teutonic Order, including in the south the present Galicia. Succeeding centuries saw wide conquest and withdrawal on the vague plains of the east, until the consummation of the great international spoliation of 1795. Could Poland have saved herself if she had had good geographic barriers? The answer lies in the Romanoff, Hapsburg, and Hohenzollern dynasties. No physical features can make him safe who dwells among thieves. Can scientific boundaries be drawn now to protect the suffering millions of Poland? Let the schoolboy and the reader of the newspaper war map answer.

Coastal Veneers of the Baltic and the Near East

We cite one further class of examples and attempt to apply the barrier theory. Mackinder in his own vivid manner has described the coastal veneers of the Baltic, the Adriatic, and the Aegean Seas. On the Baltic is a veneer of Germans in East Prussia backed by a hinterland of Poles. On the Adriatic is a veneer of Italians fronting the solid mass of Yugo-Slavs and offering one of the toughest problems of the settlement soon to be made. At Saloniki are Greeks, and in the valleys that lead down to the Aegean border are Bulgarians. Similar is the distribution of Greek and Turk east of the Aegean. Such are the tests by which the barrier theory is met, and in these tests it is found wanting. We are thrown back upon the will, upon mutual concessions, upon assimilation, favored by democratic governments, and no doubt upon a residuum of physical restraint exercised upon those who disdain moral control. We gather our conclusions in the following paragraphs.

Conclusions

The present arrangement of human groups is a heritage from long-existing biological conditions of dispersal, migration, and intermingling, complicated by the vagaries of the human will, as seen in lust of conquest, love of war, dynastic ambitions, and economic greed.

The necessity of boundary lines has come with the filling of the world's spaces, the pressure of population on resources, and the lifting and widening of the material standards of living.

We hold with Lyde that civilization is "progress in the art of living together." Any nation is partial and backward in civilization in proportion as its standards of international dealing fall below its laws of intranational conduct.

We do not accept Holdich's virtual admission that international ethics are permanently so low that defensive boundaries will always be essential to reasonable safety against attack.

On the other hand we are not convinced that boundaries should be deliberately and always placed where people meet. We would not avoid such lines if the greater justice to the greater number on both sides of the proposed fence seems to require them. We might for the present give questionable or quarrelsome neighbors as high a fence as is practicable, as we try to keep the weak of all sorts from overpressing temptation.

Approximately twenty-five human groups in Europe show such unity of purpose and ideal, such community of interest, of history, and of hopes, and each in such reasonable numbers, that they have embarked or deserve to embark on a career of nationality.

The world is now pretty well agreed that ruling houses are obsolete, that the interests of great powers are no more valid than those of small powers, and that economic equilibrium or self-sufficiency in natural resources does not outweigh the rights and desires of any truly national group.

Europe has an exceptional number of physical units which in primitive days could serve as the cradles of nations. In the advanced conditions and high densities of today, however, the number of physical compartments falls far short of the number of groups which properly wish independence.

Modern appliances for war have impaired the security once gained through physical barriers. Heights of land and all kinds of waters give important aid in war, but they do not fend off war. We cannot "destroy the germs of frontier dispute by drawing physical boundaries."

We must draw boundaries on defensible or separating lines if possible but at all events in such a way as to work substantial justice.

Here is the sphere of a league of nations, embodying the will of all mature civilization that imperfectly civilized groups shall no longer make biological inferences or blasphemous conceptions of divine destiny the excuse for perpetuating tooth-and-claw methods in the relations of peoples.

Bibliography

H. B. George: The Relations of Geography and History, Clarendon Press, Oxford, 1901.

A Century of Boundary Arbitration, *The Nation*, No. 2082, Vol. 80, 1905, p. 410, New York.

Lord Curzon of Kedleston: Frontiers (Romanes Lecture, 1907), Clarendon Press, Oxford, 1907.

E. C. Semple: Geographical Boundaries, *Bull. Amer. Geogr. Soc.*, Vol. 39, 1907, pp. 385-397 and 449-463.

Patrick Geddes: Boundaries and Frontiers, *Westminster Rev.*, Vol. 169, 1908, pp. 257-260.

Joseph Schafer: The British Attitude toward the Oregon Question 1815-1846, *Amer. Hist. Rev.*, Vol. 16, 1911, pp. 273-299.

R. L. Schuyler: Polk and Oregon Compromise of 1846, *Polit. Sci. Journ.*, Vol. 26, 1911, pp. 443-461.

C. C. Hyde: Notes on Rivers as Boundaries, *Amer. Journ. of Internatl. Law*, Vol. 6, 1912, pp. 901-909.

Lawrence Martin: Glaciers and International Boundaries, *Scientific American Suppl.* Vol. 76, 1913, p. 129.

James White: Boundary Disputes and Treaties, Glasgow, Brook & Co., Toronto, 1914

L. W. Lyde: Types of Political Frontiers in Europe (with discussion), *Geogr. Journ.*, Vol. 45, 1915, pp. 126-145.

S. N. Patten: Unnatural Boundaries of European States, *Survey*, Vol. 34, 1915, pp. 24-32.

T. H. Holdich: Political Boundaries, *Nineteenth Century*, Vol. 77, 1915, pp. 1119-1137.

T. H. Holdich: Military Aspects of a Frontier, *Nineteenth Century*, Vol. 78, 1915, pp. 936-947.

L. W. Lyde: Some Frontiers of To-morrow, A. and C. Black, Ltd., London, 1915 (noticed in the *Geogr. Journ.*, Vol. 47, 1916, pp. 216-217).

T. H. Holdich: Political Frontiers and Boundary Making, Macmillan & Co., London, 1916 (reviewed in the *Geogr. Journ.*, Vol. 49, 1917, pp. 58-61).

T. H. Holdich: Geographical Problems in Boundary Making (with discussion), *Geogr. Journ.*, Vol. 47, 1916, pp. 421-440.

T. H. Holdich: Political Boundaries, *Scottish Geogr. Mag.*, Vol. 32, 1916, pp. 497-507 (British Association for the Advancement of Science paper; discussed in *Geogr. Journ.*, Vol. 48, 1916, pp. 420-422).

L. W. Lyde: River Frontiers in Europe, *Scottish Geogr. Mag.*, Vol. 32, 1916, pp. 545-555.

Leon Dominian: The Frontiers of Language and Nationality in Europe, Amer. Geogr. Soc., by Henry Holt & Co., New York, 1917.

D. W. Johnson: The Rôle of Political Boundaries, *Geogr. Rev.*, Vol. 4, 1917, pp. 208-213.

M. I. Newbigin: Race and Nationality (with discussion), *Geogr. Journ.*, Vol. 50, 1917, pp. 313-335.

H. J. Mackinder: Some Geographical Aspects of International Reconstruction, *Scottish Geogr. Mag.*, Vol. 33, 1917, pp. 1-11.

T. H. Holdich: Boundaries in Europe and the Near East, Macmillan & Co., London, 1918.

C. B. Fawcett: Frontiers: A Study in Political Geography, Clarendon Press, Oxford, 1918.

THE NORTHEASTERN MINNESOTA FOREST FIRES OF OCTOBER 12, 1918*

By H. W. RICHARDSON
U. S. Weather Bureau, Duluth, Minn.

Compared with other great conflagrations of historical record, the fires which swept over northeastern Minnesota during the afternoon and night of Saturday, October 12, 1918, will easily take rank among those of exceptional character as to area, rapidity of travel, loss of life and property, and general devastation in the regions affected.

The Burned Areas and the Losses

In this most recent of Minnesota's holocausts over 8,000 square miles were affected, and approximately 2,000 square miles of territory, mainly within a radius of 50 to 100 miles of Duluth, were more or less completely burned over, including great tracts of forest—mostly second growth and consisting largely of white pine, tamarack, and birch, as well as vast quantities of cord wood—farm buildings, settlers' homes, whole villages and one small city, suburban portions of Duluth, and summer homes or cottages and hunting and fishing lodges in the outlying districts. These burned sections (see map, Fig. 1) include parts of St. Louis, Carlton, Pine, Aitkin, Itasca Cass, and Crow Wing Counties, together with tracts adjoining Superior in Douglas County, Wisconsin, opposite the southwestern suburbs of Duluth The greatest damage occurred in St. Louis and Carlton Counties. The following places were either ravaged somewhat or partially or wholly destroyed: Adolph, Aitkin, Arnold, Autumba, Bain, Brookston, Bruno Caribou Lake, Cloquet, Cloverton, Corona, Cromwell, Exeter Farms, Five Corners, Floodwood, Fond du Lac Indian Reservation, Grand Lake, Har ney, Hermantown, Kettle River, Lakewood, McGregor, Maple Grove, Moose Lake, Munger, Pike Lake, Saginaw, Sturgeon Lake, Tamarack, Twig Wawini, and Willow River, while the affected suburbs of Duluth included most of northwestern Woodland, the Calvary Road district, and portions o Lakeside and Lester Park. Nearly 400 persons lost their lives, about 2,000 were more or less seriously burned, and about 13,000 rendered homeless The loss of live stock was heavy, while the property losses (including severa million feet of standing timber, largely second growth, as stated) may reach or exceed $25,000,000 in value, nearly $4,000,000 of the losses occurrin in St. Louis County, probably not more than one-fourth of the total bein covered by insurance. It will require a painstaking and expert survey e tending over many months definitely to establish the figures. A fair estimate of the property loss can be based on the statements made by local officials of the Relief Commission at the time to the effect that approximately $5,000,000 would be needed properly to meet the requirements of temporary assistance and probably $20,000,000 for a semblance of permanent rehabilitation. Between 40,000 and 50,000 persons were affected in one way and another by the fire.

---

* A brief preliminary note (with map) on this conflagration, based on the newspaper reports of th time, was published in the December, 1918, *Review* (pp. 513-514). The presented extended account a detailed map (Fig. 1) are based on the accurate data since become available.—Edit. Note.

Character of the Fire

At the outset it must be borne in mind that this was not merely one great fire, but fifty to seventy-five or more which united to a considerable extent, were fanned to huge proportions by the wind, and then, with the increasing energy developed by the consequent violent air movement attending rapid combustion on such an enormous scale, advanced over vast areas with almost incredible speed.

Predisposing Factors

For some days before the great fires in question there had been numerous brush and peat-bog fires burning over limited patches. These were directly traceable to various causes, such as carelessness on the part of campers, automobilists, and train crews and on the part of farmers and settlers in burning brush to clear land. Such fires are quite common to this section, especially during the dry periods in summer and autumn, and the public in general does not ordinarily regard them seriously. The conditions which favored the full development of the great fires were primarily those of drought (the season being the driest for 48 years) and the fresh winds that occurred on October 12.

General Meteorological Conditions

Except for the continuance of the dry weather the general meteorological conditions on the morning of October 12 were not unusual for the season. The weather map, based on the 8 A. M. observations of that date (Fig. 2), showed a low barometric pressure area of moderate strength centered over western Ontario, the inclosing isobar being 29.6 inches (corrected to sea-level pressure), and an area of high barometer of 30.2 inches extending from Wyoming, Utah, and Nevada to Washington, so that the air-pressure gradient was by no means extraordinary. Fair weather and winds from westerly directions, fresh or moderately strong (about 30-mile an hour rates), were indicated, and in addition a "small craft" wind warning was ordered displayed on western Lake Superior at 10:30 A. M. All of this was given the usual publicity.

Wind Velocities at Duluth

At Duluth the weather was clear until about 12:30 P. M., when smoke began moving in from westerly sources; but, because of the occasional

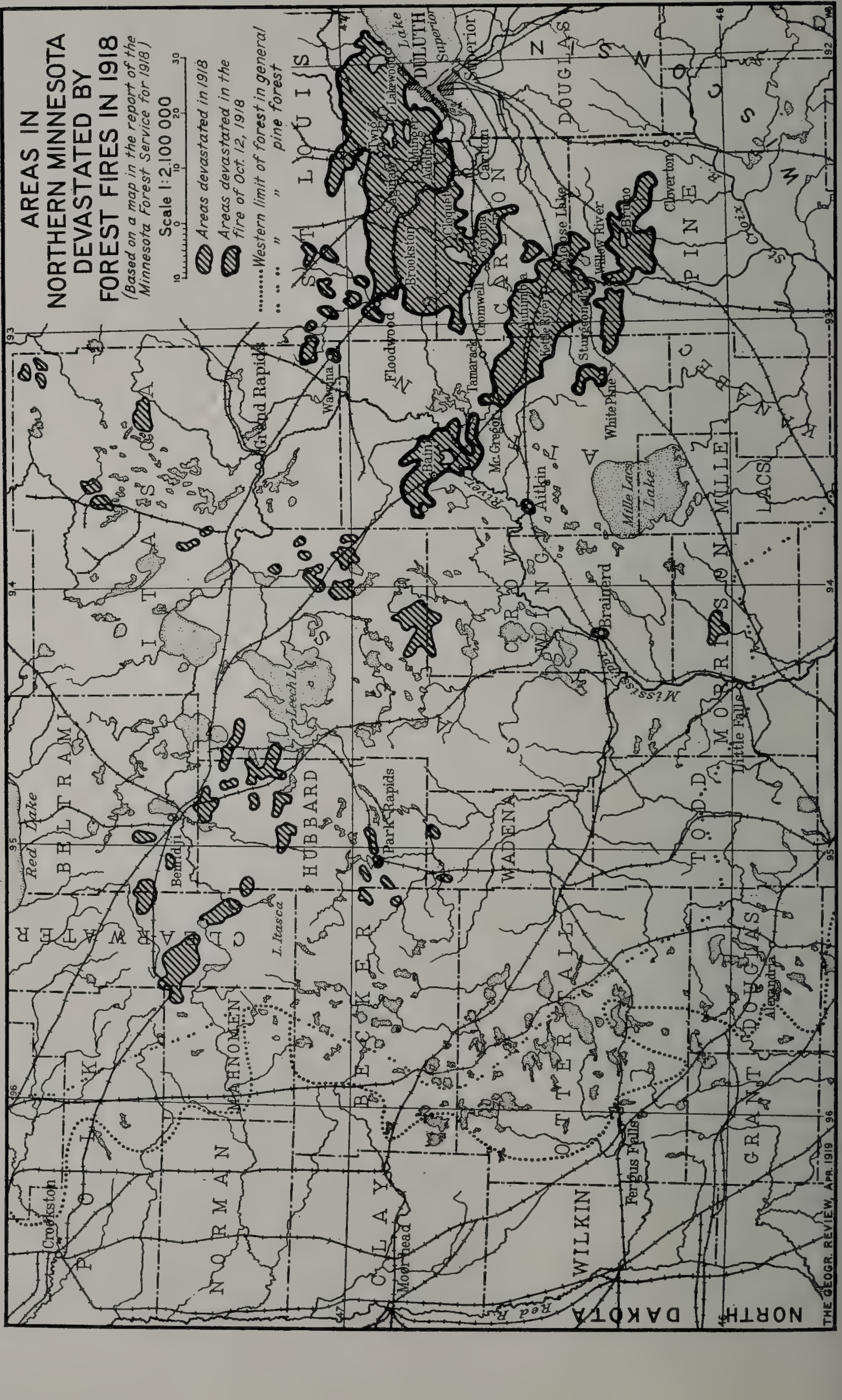


FIG. 1—Map of northern Minnesota showing the areas devastated by forest fires in 1918. Scale, 1:2,100,000. The western forest limits are based on a map by Upham and Butters (reproduced in *Minnesota Geol. Survey Bulle. 12 and 13*, 1915 and 1917).

previous occurrence of such a condition, the smoke attracted little attention. After 2:30 P. M. it increased considerably, the sun appearing red or being altogether obscured most of the time thereafter—a manifestation common to fires of unusual character. The wind gradually increased also, reaching 30 to 40-mile rates from the west at times until about 3 P. M. (Fig. 3). After that hour there was a steady rise to gale proportions, 50 to 60-mile rates from the west-southwest-northwest occurring between 4:15 P. M. and 9 P. M. After this hour the wind continued at 40-mile velocities until about 2 A. M. of the 13th, subsiding materially thereafter. The highest 5-minute rate was 65 miles an hour from the west at 5:52 P. M., while the extreme speed for a less period was 76 miles about that time.

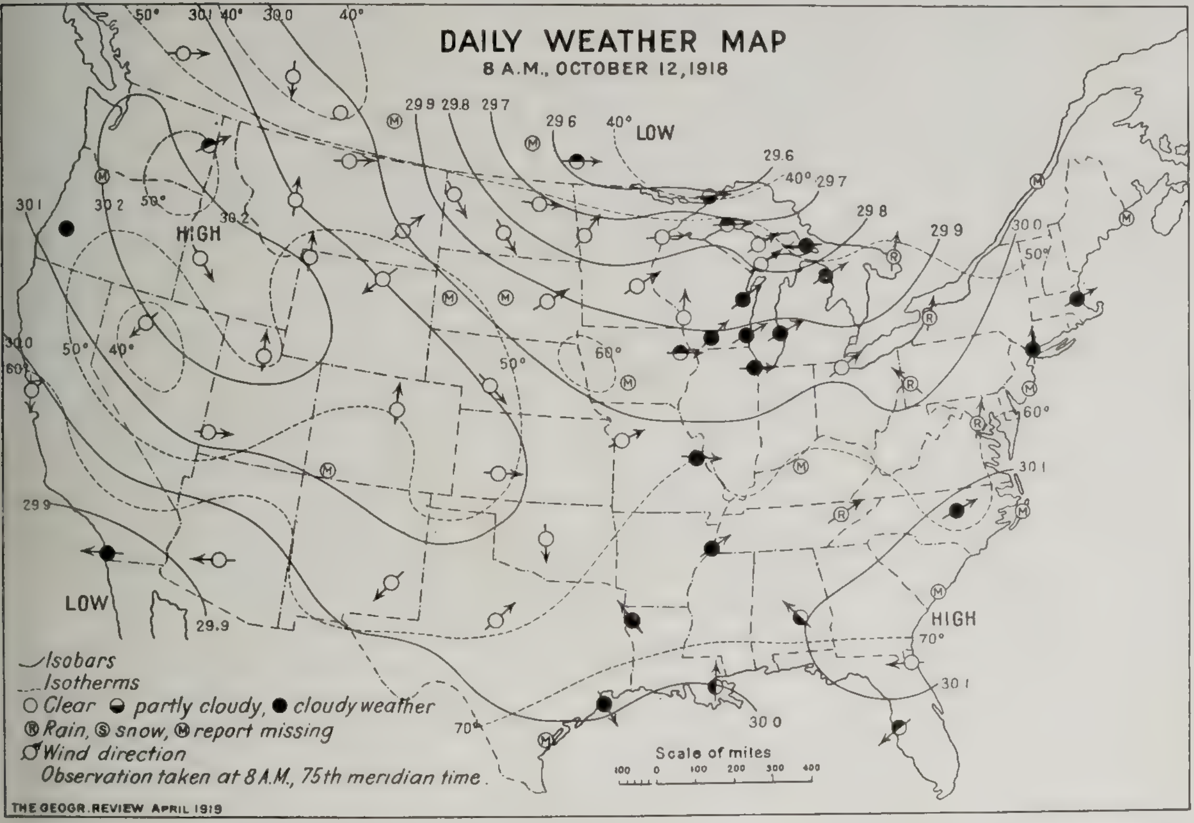


FIG. 2—Copy of the daily weather map of the U. S. Weather Bureau for October 12, 1918, issued at Duluth, Minn. Scale, 1:42,000,000.

THE FIRE AT DULUTH AND ITS ENVIRONS

Between 4 P. M. and 5 P. M. very dense volumes of smoke drifted rapidly in from the west, showing that fires of marked intensity and extent were occurring in the vicinity. Between 4 P. M. and 6 P. M. rather alarming reports began to reach Duluth. In spite of all this many people left about that time for week-end visits to cottages on nearby lakes or cabins in clearings. Occasionally during the late afternoon and far into the night the dense smoke[1] showed deep red color at points from south by way of west

---

[1] For an account of the diffusion of the smoke clouds from the Minnesota forest fires over a large portion of the United States east of the Missouri River, see the note under "Geographical Record" in this issue.—EDIT. NOTE.

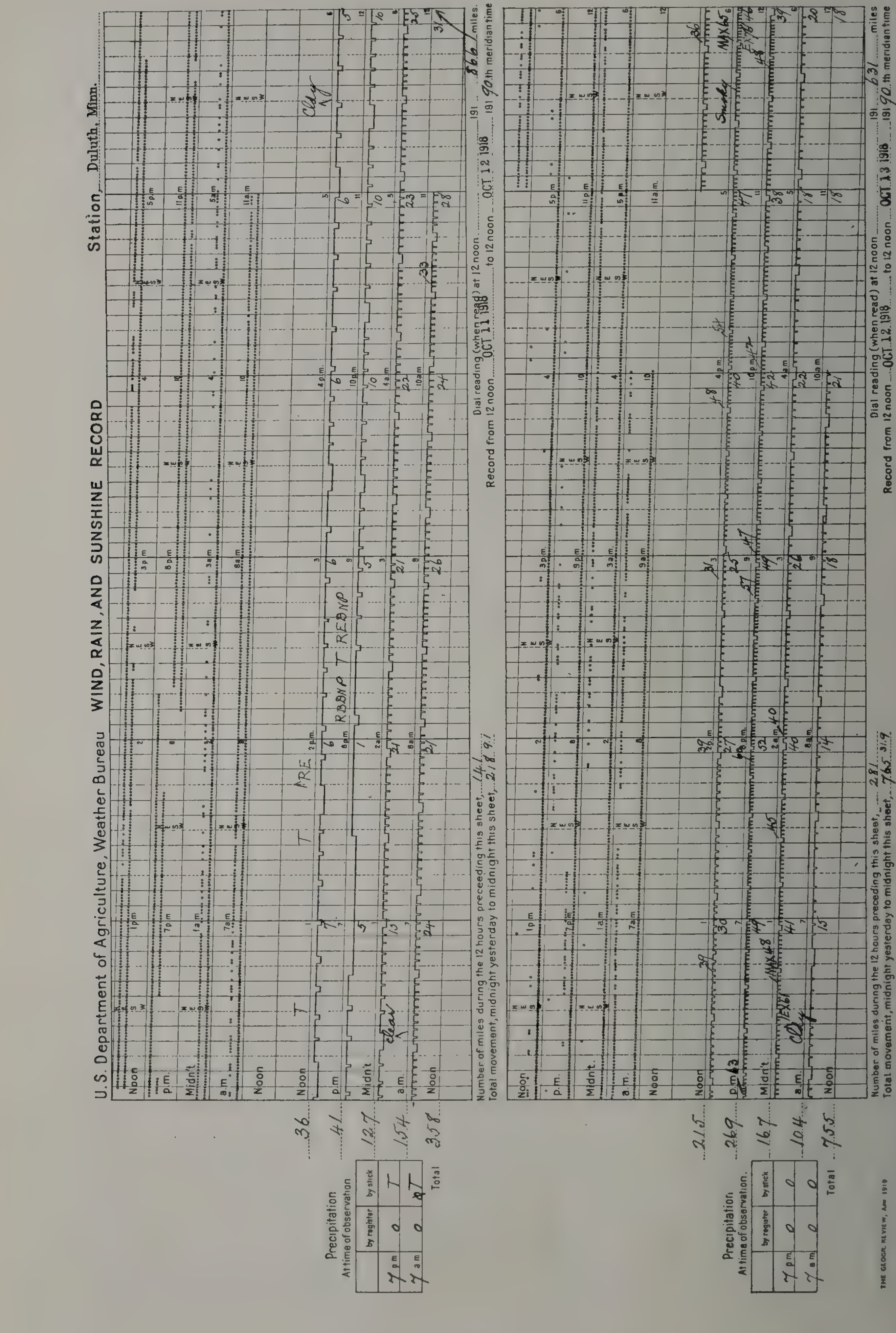


FIG. 3—Wind direction and velocity record at Duluth, Minn., from noon on October 11, 1918, to noon on October 13, 1918 (redrawn from photostat copy of original record). For explanation see bottom of opposite page.

to north. About 5:30 P. M. realization of the danger began to dawn when authentic news of disaster in adjoining districts began reaching the city. Brookston (about 35 miles west of Duluth) was destroyed at 4 P. M., and after the belated report of this calamity events moved swiftly. Telephone and telegraph lines to the southwest, west, and northwest were more or less demoralized or down by 6 P. M. and generally so after that hour.

At 6 P. M., as fires were beginning to menace Woodland (a northern suburb of Duluth), the fire department called upon the military forces for help in fighting the fire and in rescue work. By 7 P. M. companies A, B, C, and D of the Home Guard, C and D of the 4th Minnesota Infantry, and A and B of the Motor Corps were fully mobilized and in action. They were assisted by thousands of volunteer citizens, many of them aiding with their automobiles. All night long these men and also many women toiled with the utmost energy and fortitude, rescuing the helpless, fighting fire, and saving property where possible. Many of the soldiers continued on duty from 36 to 48 hours without rest, and for nearly two weeks hundreds of them kept up the work of rescuing life, guarding property, and patrolling the fire zone.

Unlimited praise is due the soldiers, motor corps, train crews, and volunteer citizens. The whole country was searched for days as thoroughly as practicable. Otherwise thousands of people would have perished. The automobile rescue work on the night of the 12th was rendered especially hazardous by reason of the necessity of speed at a time when even to use lights was almost futile because of the dense, suffocating, and blinding smoke and the flying sparks and brands. Quite often there would be flames on both sides of the road. Many accidents were caused by collisions and ditching of automobiles. Many of the rescuers had to abandon their cars and flee for their lives. Fully one hundred automobiles were thus destroyed, and a very large number were badly damaged. Some of the relief trains also ran through sections where there were roaring and terrifying conflagrations on all sides. There were innumerable instances of the most splendid heroism and the noblest self-sacrifice. No danger was too great. It was a sublime exemplification of true Americanism in a time of gravest peril.

There were all kinds of alarming rumors, of course; but it was well established by midnight of the 12th that huge sections of the neighboring country were in flames or already in ashes and that many towns and villages had been damaged if not wholly destroyed, with consequent loss of life.

EXPLANATION OF FIG. 3—The vertical lines indicate 5-minute intervals. The dots in the upper part of each of the two sections of the record show the direction from which the wind was blowing each minute, the level of the dot-lines (defined by the letters N. E. S. W.) indicating the components of the four points of the compass which went to make up the wind direction at a given moment. The wind velocity is shown in the dentated line in the lower part of the record, each dentation representing a velocity of one mile within the time indicated. The hand-written figures in the velocity record show the total number of miles recorded in the hour and the maximum velocities, respectively. Maximum velocities are for 5-minute periods, and rates less than 30 miles per hour are not indicated in this case. As the time is indicated for both direction and velocity it is easy to associate the two. Note the high velocities between 5.35 P.M. and 9.00 P.M., on October 12, especially near 6.00 P.M.

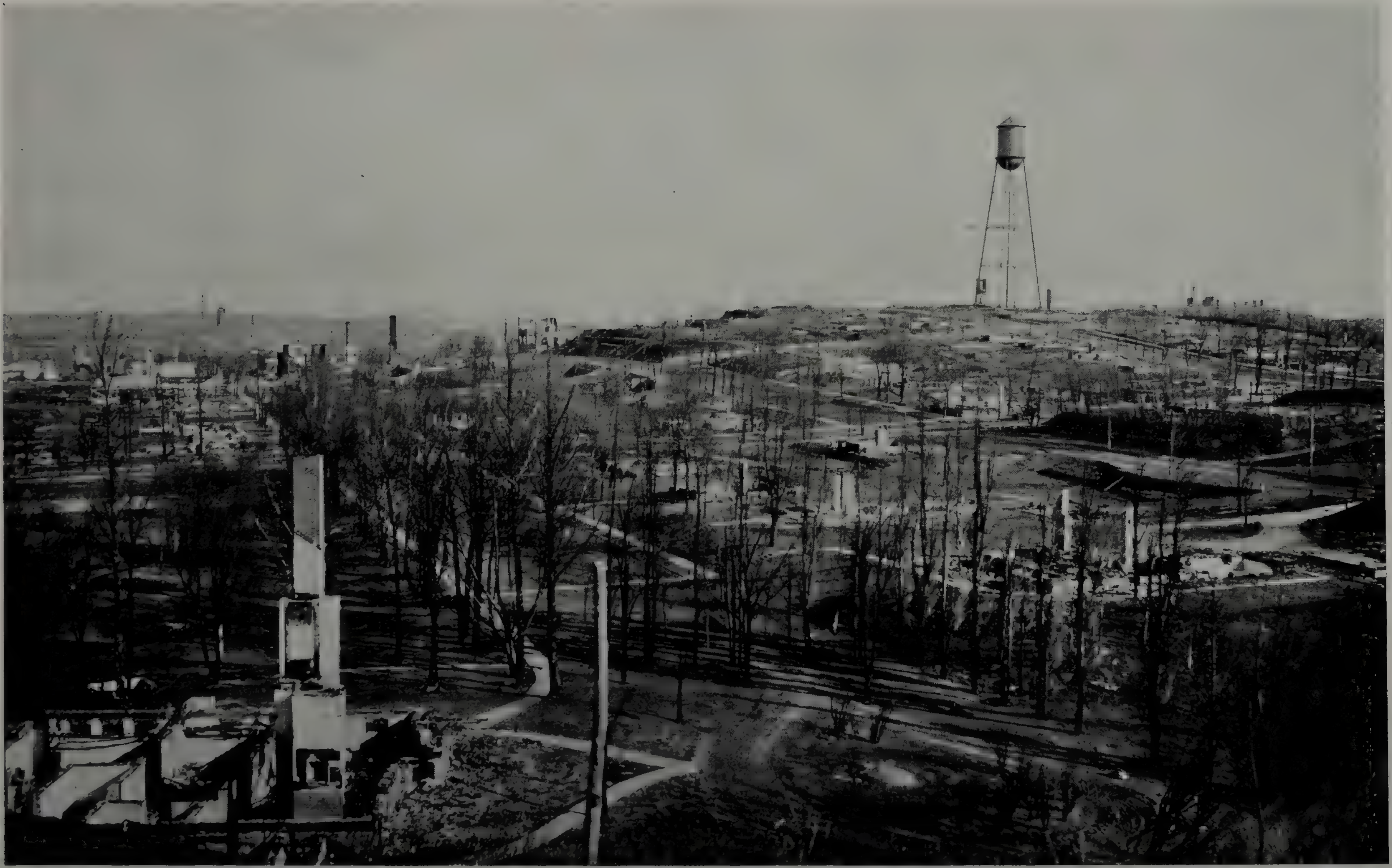


Fig. 4—Partial view of Cloquet, Minn., showing completely devastated residence district as it appeared two days after the fire of October 12, 1918. A portion of the destroyed business section appears in the distance at the left. (Photo by H. McKenzie.)

Extent and Nature of the Devastation

The various fires traveled fast, as much as 15 to 20 miles an hour and at even higher speed in some cases. At Moose Lake the fire frontage was about 7 miles in extent, at Arthyde 3 miles, at Corona 4 miles, and at Cloquet 6 to 8 miles, while near Duluth from west to north and including the northern suburbs there was an irregular frontage of fully 10 miles. Occasionally vast billows of detached flame would leap across rivers, streams, small lakes, roads, and other open spaces in front of the walls of fire. An interesting feature observed in a few instances was that, as the main fires advanced or moved about, there were back-firing effects which eventually caused some of them to die out. This was a phenomenon attending the fire itself and has no reference to the methods of back-firing usually practiced. Human efforts of this sort were generally unavailing during the worst of the fire storm, but where such work was done sufficiently in advance it was fairly effective. The greatest devastation occurred during the height of the 50 to 60-mile westerly gale, between 4 P. M. and 9 P. M.

Moose Lake, in Carlton County, about 50 miles southwest of Duluth, had probably the largest proportionate loss of life, 200 being burned to death in that locality. Later 87 charred bodies (many unidentified) were interred there in one large trench grave.

Cloquet (8,000 population), in Carlton County, about 25 miles west-southwest of Duluth, suffered the most complete fire loss. The property destruction in the residence and business sections was practically total (Fig. 4), but most of the lumber and paper mills remained without serious damage. A remarkable feature is that but five lives were lost in what constituted the city limits. By the quick action and good management of the railroad people and prominent citizens practically the whole population was safely moved out in about two hours, mostly to Duluth and Superior. Passenger coaches, box cars, flat cars, and coal cars were utilized and made up in several long trains, the cars being packed to capacity and their occupants carrying little or no baggage. The station was in flames as the last train departed. Great numbers also left in automobiles and other conveyances and even on foot, taking the road to Carlton, six miles distant, which proved a safe refuge. Fully one hundred lives were lost in the district adjacent to Cloquet.

Settlers and farmers and townspeople saw the product of their years of toil and thrift swept away in a few moments. Thousands of prosperous citizens were rendered destitute. This was quite the common experience, although some were fortunate in having insurance. In spite of all the misery and loss a fine courage and a general optimism prevailed, and re-establishment was soon progressing.

Loss of Animal Life

The dairy interests suffered enormous loss. Large numbers of horses, cattle, pigs, poultry, dogs, and wild game such as deer and rabbits, were burned, and even fish in some of the shallower streams are reported killed. Free veterinary aid was furnished to injured stock as far as practicable. In some of the outlying settlements timber wolves were later reported as becoming numerous and destructive to remaining and unprotected live stock.

Damage to Roads

Immense damage resulted to roads—especially those crossing marshlands, peat bogs, and muskegs. A vast number of bridges and culverts had to be replaced. The need of such repairs greatly retarded relief work. Rural mail routes were disorganized and service could only gradually be resumed.

Human Tragedies

The pitiful tragedies and thrilling escapes reported were so numerous that any attempt at detailed description of them would fill a volume. In some instances whole families lost their lives; in others the parents were survived by the very young; or in still others only the very old or the crippled or the badly burned were saved. There were numerous instances of premature childbirth, sometimes under most distressing circumstances, and literally hundreds of similar heartrending experiences. In one case a man lost his wife, his children, and all his immediate relatives—a total of 18 persons; all were buried in one grave. The fires came so swiftly that many people escaped only after the most heroic efforts and terrifying hardships. Scores saved themselves by plunging into lakes and streams or by lying face downward in ditches or other depressions. Many such were almost suffocated by the smoke or were badly burned; others were actually drowned; and still others were first suffocated and then burned beyond identification. Some victims were actually burned to death while asleep in their beds.

For the most part the damage in the burned areas was in the nature of annihilation. The desolation was of an altogether weird and depressing character, reminding one of Doré's illustrations of Dante's Inferno.

Freaks of the Fire

The fires played strange tricks. On one side of a road there would be nothing but a charred tangle of fallen or partly fallen tree trunks, or a mass of ashes extending for miles with here and there a stump or boulder showing, while on the opposite side for the distance of a mile or more trees and shrubbery and grass would be untouched. A house and barn would be burned to ashes while between the two might stand an undamaged haystack. Occasionally houses were left intact while all around would be desolation; or perhaps one small area of forest might be left inviolate while for miles in all directions nothing but burned waste could be seen. In some cases in the thoroughly burned districts poultry, pigs, dogs, cattle, or horses would be found wandering disconsolately about the ruins of their former comfortable domiciles. How under the circumstances any of these animals escaped unscathed is one of the mysteries.

Relief Measures

The fire situation was well in hand by October 14, and on the 19th copious rains effectually disposed of smoldering embers which had continued a menace.

The rescue and relief measures were immediate; they were exceptionally well organized, splendidly generous, and sympathetic. The temporary relief included a rationing scheme for the sufferers and for live stock, supplies of fuel, and even moderate sums of money regularly furnished. Thousands of articles of clothing and household and farm equipment were distributed, all free. This work was carried on by the Relief Commission under the direct supervision of the Red Cross, with headquarters at the Armory in Duluth, while other organizations rendered splendid service of the same kind in co-operation with the Red Cross. Hundreds of the simplest form of emergency houses and barns, and in some instances community barns, were built. After the fire a hundred or more automobiles and autotrucks were engaged in searching the countryside for casualties and for people in distress. Thousands of bushels of potatoes were dug and stored, and much temporary shelter construction was done by volunteers. Every effort was made to provide employment for the vast number of refugees. Arrangements were also begun to procure seed either free or at cost to settlers and farmers for spring planting. The subjects of abatement of taxes and re-establishment of land surveys and titles likewise received attention from the authorities.

Effect of the Fire on the Soil

In the opinion of local authorities, men of long experience and practical knowledge of similar events, the recent fires have done little if any damage to the soil. The prevailing idea is that the large quantities of burned vegetation (especially wood, on account of its potash content) will be beneficial rather than harmful, particularly where the burning was rapid and not too deep, and that the extensive and thorough burning will facilitate land clearing. Commenting upon the idea among settlers that peat lands are improved by burning and that this belief is the cause of many settlers' fires, an official of the Forest Service of the U. S. Department of Agriculture states that fires in peat lands are hard to control and expresses the fear that if these fires are allowed to continue to burn in the peat lands down to the white sands, as was the case in the big fire near McGregor, it will be but a matter of time until Minnesota will have a moving sand-dune problem, like Nebraska.

Cause of the High Wind

Careful consideration of the available facts seems to warrant the conclusion that the major force of the gale which prevailed during the late afternoon and night of October 12 was fire-created. As has been previously stated, the weather map on the morning of that date apparently favored wind velocities not much in excess of 30-mile rates. But, inasmuch as numerous small fires were then prevailing over extensive but more or less separated areas, and as the record-breaking drought had caused a tinder-dry condition of vegetation, a wind of any sustained force was all that was required to put into activity a series of united conflagrations that gathered tremendous impetus and quickly thwarted the most desperate attempts at effective control. Reliable reports show that in the immediate vicinity of the big fires the effect was comparable to a grate fire of enormous proportions; that there was an accompanying air movement or combustive draft of hurricane force; that the wind velocity was immeasurably greater in the immediate vicinity of the fires than it was a few miles distant, as in Duluth; and that there was a very noticeable decrease of wind from the fire zone outward. It has been estimated by some that while the wind at the Weather Bureau Station was blowing at the rate of 60 miles an hour it

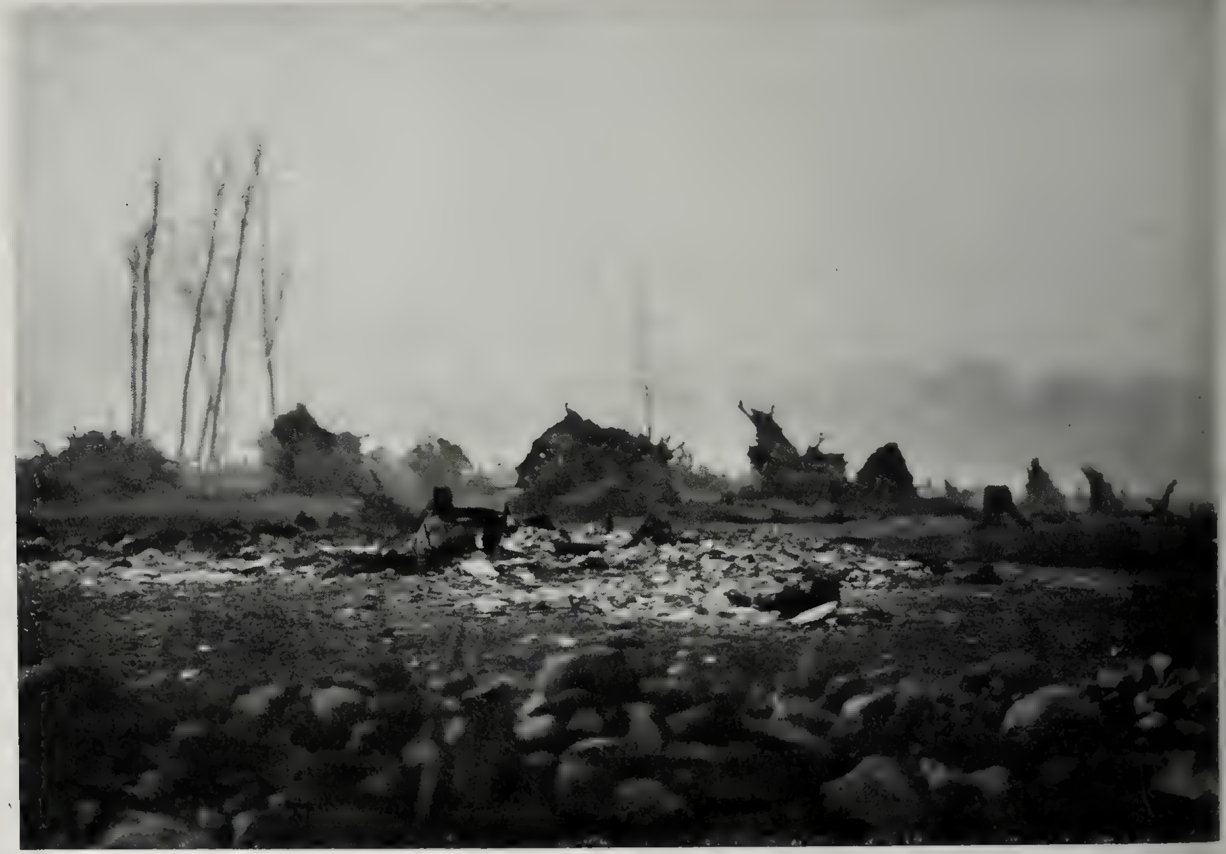


FIG. 5—Scene near Duluth showing trees uprooted by the fire gale on October 12, 1918. The effect of the various fires was comparable to that of a grate fire of enormous proportions, and in their immediate vicinity there was an accompanying air movement or combustive draft of hurricane force that probably attained a velocity of 80 to 90 miles an hour. Burned residence in middle ground. Distant view obscured by smoke from smoldering debris. Photo taken October 13, 1918, camera facing east-southeast. (Photo by H. McKenzie.)

must surely have been blowing at a rate of 80 to 90 miles adjoining the fire fronts from two to six miles or more distant from the station. There was an attendant deafening roar of fire and wind combined. In numerous instances people were thrown flat on the ground, and some automobiles were overturned by the wind in the vicinity of the fires. There are no authenticated cases of such accidents as these at the time except near the fire fronts. In many instances the rescue automobile engines and radiators were found to be clogged or covered with quantities of sand and gravel blown upon them in the fire districts. This sort of trouble was not experienced elsewhere during that period.

Reasons for Seriousness of the Fire

Indirectly the fire losses of life and property are believed to be largely due to inadequate forest ranger service, overdrainage of swamp lands and the lack of control gates for the drainage ditches, insufficient supervision and control of land-clearing and logging operations (particularly as to brush burnings), insufficient forestry laws and inability to enforce existing laws and to locate and punish offenders, public ignorance of or indifference to forestry laws already enacted, and the difficulty of quickly warning people who live in isolated sections like northeastern Minnesota. The inadequacy of forest fire patrol is illustrated by the fact that, since the state forestry appropriations were reduced by legislative acts in 1915 and 1917, the service in the matter of personnel is so limited that one ranger must patrol from 700 to 1,200 or more square miles, that is anywhere from 20 to 50 townships. And this in an immense section of the state still very largely covered with forest growth and brush, where the cleared areas are generally small in comparison with the surrounding wild country.

Need of More Adequate Fire Protective Measures

As to the security afforded by proper fire patrol the State Forester, in a preliminary report regarding the recent catastrophe, says:

> With a sufficient number of rangers to see that burning is done only under proper restriction and control, and to see that any fires which may start accidentally or otherwise are promptly extinguished, there would be no opportunity for a big fire. Even during a high wind the starting of one fire is not likely to destroy a whole community. It is only when a fire has been allowed to burn long enough to attain a wide front, or when a number of small fires are close enough to unite easily, that settlements are seriously endangered. Neither of these conditions should ever exist, but to prevent them requires systematic patrol by a considerable force throughout the danger seasons. During this fire season the few rangers and patrolmen discovered and extinguished hundreds of fires. They arrested 60 persons and convicted 32.

Education, control, and force are needed to effect fire prevention. This of course should include warnings, but even the latter, when issued immediately before great danger of this kind, are usually quite futile, for, sad to relate, people are too often obsessed with a false sense of personal security and immunity. Warnings, to be properly heeded, should be backed up with some sort of legal or moral penalty. The necessity for systematic propaganda of an educational nature is clearly obvious, especially as to protective measures. Legislative action is needed for more adequate forest ranger service, thorough supervision of brush or land-clearance burnings, and severe and enforced penalties for illegalities.

Last, but not by any means least in importance as a protective measure—possibly one of large pecuniary profit—clover and grass seed should be sown, and sheep and cattle should be put on these lands as fast as practicable. Such animals will not only keep down the weeds and rank grass, which at times are a fire menace, but will also provide wool, leather, meat, and dairy and other products which might easily become an important factor in helping to clothe and feed the world.

ALPINE FELL-FIELDS OF EASTERN NORTH AMERICA

By JOHN W. HARSHBERGER
University of Pennsylvania

The *fjeld* of Norwegian geographers is a high, barren plateau, unfit for cultivation. The Dovre Fjeld is such a mountain plateau of the Scandinavian range, lying between latitudes 62° and 62½° in Norway and forming a continuation of the Kiölen Range. According to the Century Dictionary the word is the same as "fell" (from Middle English *fel, fell,* from Icelandic *fjall, fell* = Swedish *fjäll* = Danish *fjaeld,* a hill; perhaps connected with "field"). Plant geographers, such as Warming in the English edition of his "Oecology of Plants,"[1] render it as "fell-field," while Schröter[2] uses the term *Gesteinsfluren.* The German equivalent is *Felsenfluren,* and the Danish idea is expressed in the combination *Fjaeldmarker.* The idea of fell-field is a rocky flat, or plateau, situated in arctic or subarctic regions or on the alpine summits of mountains in northern as well as southern latitudes. The soil of a fell-field is not continuous but is broken by stones, rocks, boulders, rocky slabs, or outcropping ledges into pockets, crannies, or small areas circumscribed by the scattered or projecting rocks. Hence the surface of the fell-field is never completely covered with plants. Between the scattered patches of vegetation we see bare, pebbly, stony, sandy, or clayey soil usually devoid of humus in the ordinary acceptance of that term as meaning the organic material of the soil.

General Character of Fell-fields

Considerable attention has been paid to the fell-field formation by European phytogeographers, and our information on this subject has been summarized admirably by Eugen Warming.[3] He describes the subglacial, arctic, antarctic, and tropical fell-fields, as also those of the European mountains, and those of the mountain steppes, such as the *punas* of the Andes. According to Warming's summary the most characteristic feature of the vegetation of the fell-fields is the dwarfishness of the plants and the poverty of individuals covering the bare surface. The abundance of cryptogams, such as lichens and mosses, is noteworthy. The flora of these rocky flats may be considerably diversified, one species rarely predominating. The seed plants assume the cushion, or tufted, form and possess a perennial, strong tap-root which establishes itself in the soil pockets or descends considerable distances into the clefts or crannies between the rocks. Dwarf shrubs occur, and these are mostly evergreen. The nanism, or dwarfishness, of the herbs and shrubs is associated with high winds, the shortness of the vegetative season, and the low temperature of the air and soil. The persistence of snow partially accounts for the low temperature. The illumination is more intense on the alpine fell-fields of European mountains and the Rocky Mountains and Sierra Nevada of America. It is a well-known fact that the intensity of direct sunlight, which inhibits the growth of alpine plants, increases with altitude, because the air is more rarefied and absolutely more dry. The fluctuation of the air temperature is greater on high mountain tops than on the plains at their base. The high winds of mountain summits have an intense drying action on plants, and, although the roots of the alpine species may reach abundant water supplies in the soil, there are various structural features by which the loss of water from the plant is compensated, such as the concealment of the stomata in furrows or under the revolute leaf margins or under hairs.

---

[1] Eugen Warming: Oecology of Plants, Engl. transl., Oxford, 1909, p. 256.

[2] C. Schröter: Das Pflanzenleben der Alpen, Zurich, 1908, p. 503.

[3] *Op. cit.*, pp. 248-261.

ARCTIC FELL-FIELDS IN GREENLAND AND ICELAND

Arctic fell-fields occur in Arctic North America, northern Europe Siberia, Greenland, and Iceland. In different localities, according as the soil is more or less gravelly, clayey, or sandy, or warmer or colder owing to slope exposure, certain species occur sometimes in greater abundance and give stamp to the vegetation, so that it is possible to distinguish various associations of fell-field plants. Since Warming's work was published in English in 1909, a number of works have appeared which have thrown additional light upon the vegetation of fell-fields. Kruuse[4] describes the vegetation of the rocky-flat formation of eastern Greenland.

THE ROCKY-FLAT FORMATION OF EASTERN GREENLAND

The rocky-flat formation of eastern Greenland comprises plants which are scattered to such a degree that the bare soil appears nearly everywhere This formation may be found in all localities, flat as well as rugged, and with every kind of slope exposure. The snow cover is thin and open, the surface often being bare of snow throughout the winter. The soil is loose gravel or sand, often shifted by the arctic gales, so that erosion is sometimes great. Vegetable mold, or humus, is practically wanting. Water is never present in quantity. Kruuse divides the rocky-flat formation into (1) the common rocky-flat formation; (2) the gravel flats; (3) the gravel-sand slopes; (4) gravel hills; (5) sandy slopes. The latter subformation corresponds probably to our coastal dunes and should not be included as part of the fell-field formation.

The common rocky-field formation is found in eastern Greenland on wind-swept plateaus, hills, and declivities where rocks rise sufficiently above he surface to keep the intervening loose soil in position. Such plants as *mpetrum nigrum, Silene acaulis, Ranunculus glacialis, Sedum Rhodiola, iapensia lapponica, Vaccinium uliginosum* var. *microphyllum, Oxyria igyna, Salix herbacea, Lycopodium Selago* var. *appressa* are characteristic

---

[4] Chr. Kruuse: Rejser og Botaniske Undersögelser i Öst-Grönland mellem 65°30′ og 67°20′ i Aaren 1898-1902, samt Angmagsalik-Egnens Vegetation, *Meddelelser om Grönland*, Vol. 49, 1912, pp. 1-304.

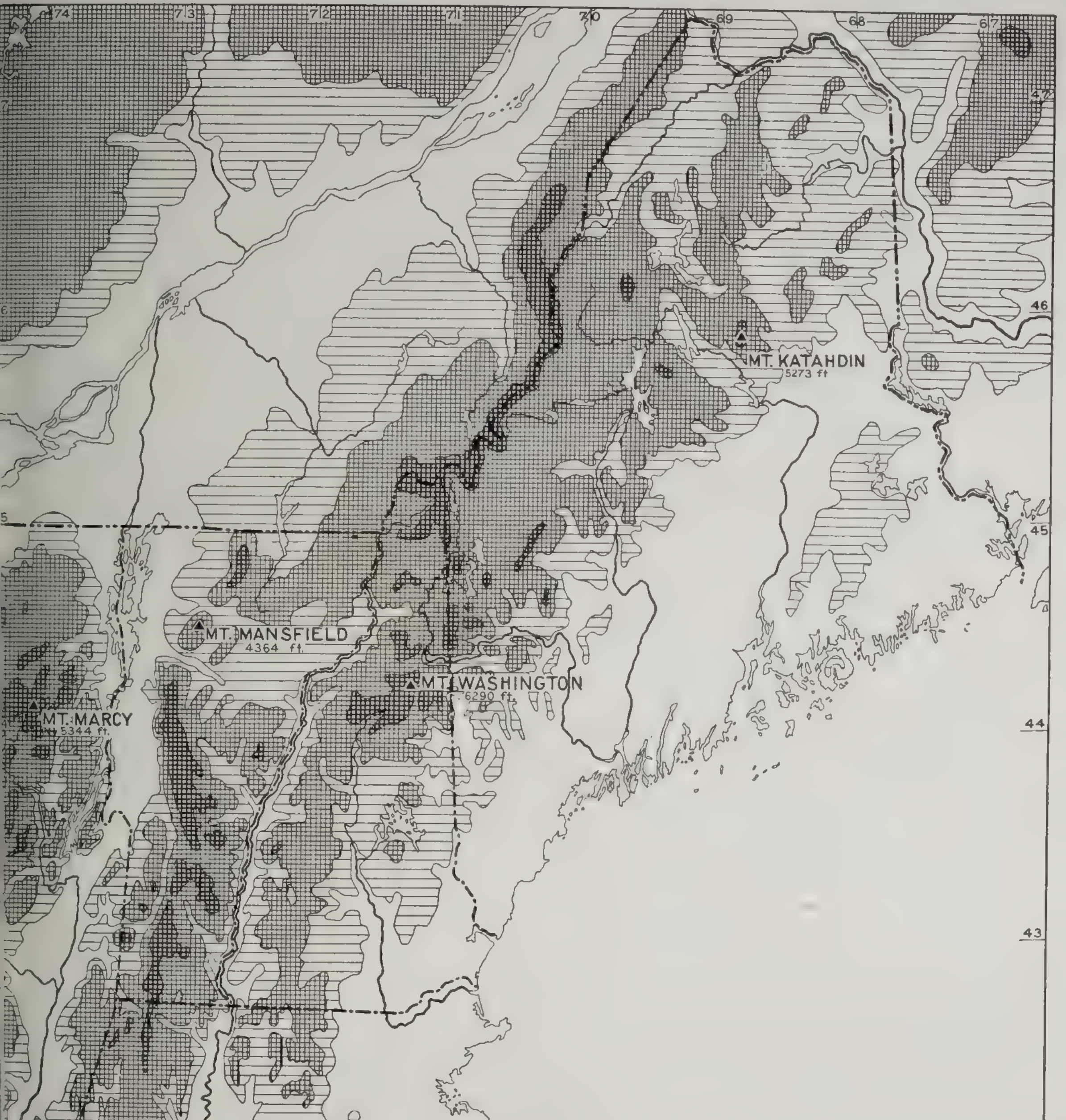


FIG. 1—Relief map of the New England region showing the location of the mountain summits aring fell-fields discussed in the text. Scale, 1:5,000,000. (For sources used in drawing contours see the *ogr. Rev.*, Vol. 3, 1917, p. 228, Fig. 1.)

on the Greenland *Fjaeldmark.* The gravel flats resemble the preceding bu
are destitute of rocks. They are replaced by coarse gravel, which is ofte
disturbed and relaid by the winter gales. The surface is generally snowles
The flora is scanty, consisting mainly of ligneous plants, which are separate
by wide intervals of soil space, frequently wind-torn and covered partiall
by gravel. The *Grusfladerne,* or gravel flats, are sometimes represented i

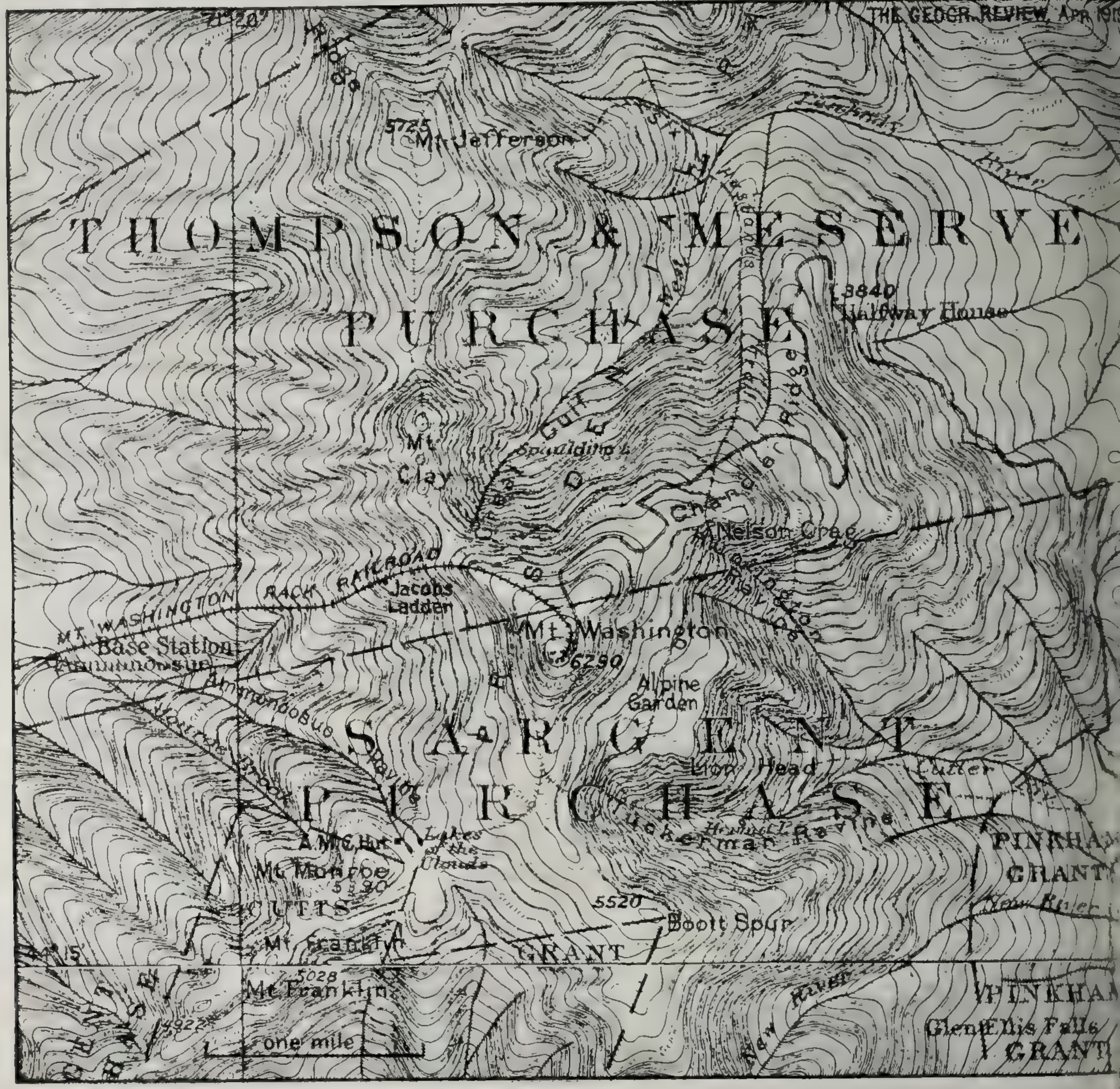


FIG. 2—Contour map of the Mt. Washington massif showing the location of the features mentioned
the text. Scale, 1:70,000. Contour interval, 20 feet. (Reproduced from the Mt. Washington and Crawf
Notch, N. H., topographic sheets, 1:62,500, of the U. S. Geological Survey, 1896, with additional names.)

marine terraces with a sparse dwarf vegetation. The gravel slopes co
sist of coarse gravel heaped up into steep slopes by the wind or slid dow
from the sides of the adjacent mountains. The vegetation consists
Silene acaulis, Salix glauca, S. herbacea, and *Armeria sibirica,* which ha
long tap-roots (2-3 meters) by which they are rendered immovable, besid
Chamaenerium latifolium, Saxifraga oppositifolia var. *reptans, Luzula co
fusa,* and *Cerastium alpinum,* which, not being anchored securely, fr
quently slide down the slopes with the moving gravel. The gravel hil

have a somewhat different vegetation owing to the greater stability of the surfaces, which are often broken by big rocks. *Azalea procumbens* is one of the plants of these gravel hills.

The Rocky-Flat Formation of Iceland

In Iceland, according to Th. Thoroddsen,[5] the rocky-flat formation occupies the largest area of the island. The vegetation of the rocky flat, which ncludes a great proportion of all the plant species of Iceland, may be divided according to soil conditions. On the higher plateaus, we find that the species and individuals become fewer in number and more scattered in growth (true fell-field), and these plants are usually stunted. On these elevated fell-fields mosses play an important part, especially *Grimmia hypnoides,* which gradually forms soil in which higher plants can grow. Fruticose lichens grow with the mosses, and "in many places on the plateau patches of *Anthelia nivalis* occur. The rocky-flat formation appears to be an original, late glacial formation . . . the different species having become associated according to their conditions of life. . . . As subdivisions, or nearly related formations, the following may be mentioned: gravelly flats (*melar*); stone-covered ridges (*holt*); fallen blocks and débris upon mountain slopes (*urd,* pl. *urdir*); steep cliffs (*hamrar*); gravelly river plains and river terraces (*eyrar*)," etc.

Gravelly flats (*melar*) also occupy large areas in the lowlands, the gravel being mixed with clay so that it cracks into polygonal cakes and forms a *rudemark.* These *rudemarker* greatly influence plant distribution, as the plants are generally confined to the gravel bands between the cakes, where they find shelter and protection. These gravel flats may be so poor in plant life that they appear quite bare and naked.

Fell-fields in South America and the European Alps

The *páramos* on the high mountains in South America from Ecuador to Venezuela are fell-fields with a typical open vegetation, the individuals scattered in clumps or of a cushion form, while the vegetation and its physiognomy on high African mountains are of similar character. On the *punas* in Chile we find that the arctic vegetation is composed largely of lichens and mosses scattered here and there over the surface. These are mountain steppes, the *punas* being poorer in species than the *páramos.*

The fell-fields are found in the Alps of Europe where both limestone and primitive rocks occur. The rubble, or talus, sets off the alpine plants which cling to the surface. In antarctic regions in South Georgia the plants form scattered cespitose tufts, as in *Poa caespitosa.* Dwarf shrubs occur and cushion plants, such as *Azorella caespitosa,* which is of a dirty-green color

---

[5] Th. Thoroddsen: An Account of the Physical Geography of Iceland. With Special Reference to the Plant Life (The Botany of Iceland, Rosenvinge and Warming, edits., Part I: 2), Copenhagen and London, 914, pp. 325-326.

and more than a meter in height and is composed of little branches with cale leaves.[6]

THE FELL-FIELDS OF THE HIGHER MOUNTAINS OF THE EASTERN UNITED STATES

The preceding account will serve as an introduction to a study of the fell-fields of eastern North America which the writer has made in botanic exploration of the higher mountains of the eastern United States (see map, Fig. 1). It will enable the reader to appreciate the general principles upon which an investigation of the fell-fields on the summits of Mt. Katahdin in Maine (5,273 feet), Mt. Washington in the White Mountains of New Hampshire (6,290 feet), Mt. Marcy (or Mt. Tahawus, to use its Indian name) in the Adirondacks of New York (5,344 feet), and Mt. Mansfield in the Green Mountains of Vermont (4,364 feet) must be based. The areas on Mt. Marcy and Mt. Mansfield which represent fell-field are circumscribed.

THE FELL-FIELD ON MT. MARCY IN THE ADIRONDACKS

On Mt. Marcy, according to the observations of the writer made on August 26, 1914, the fell-field occupies the immediate summit and roughly covers several acres of rocky ground. Here is a relatively flat surface covered with large angular blocks of crystalline rocks which have resisted the action of the elements for ages. The open summit, just below which is a rock ledge behind which the writer's party took shelter from the icy blast, may be compared to an ellipse whose axis lies in a northeast and southwest direction but whose circumference is irregular. The trail leading down directly to Keene Valley, some distance below the summit proper, passes over smooth-surfaced ledges where the crystalline core of the mountain outcrops or has been denuded of its surface covering of soil and loose boulders. Here the smooth outcropping rock has been split by deep narrow fissures. Nearer the top similar smaller outcrops occur, so that the areas actually occupied by plants are few in number and small in size. Where the smoother surfaces do not occur the loose boulders cover the summit fell-field area. These boulders are variegated by the different colors of the lichens growing on their hard and almost naked surfaces. The rocks beneath the ichens are more soft and scaly than elsewhere. Between and beneath the ufts of rock-growing mosses the interspaces are filled with dust and sand, apparently composed of particles of disintegrated rock. Between the boulders and in the rock pockets we find particles of disintegrated rock, oil, and sand mingled with the stems and leaves of the mosses and other alpine plants, so that there is provided sufficient soil to permit the growth of the few low shrubs, prostrate balsams, and other characteristic species which grow on the summit. The boulders serve to protect the growing plants from the dry winds and icy blasts which blow across the mountain dome. The soil in most places is but a few inches deep, but as the rock crannies are filled with it and with loose rock fragments, the roots of the alpine plants can descend to considerable depths without opposition to their growth.

---

[6] Additional data bearing on the botany of fell-fields will be found in the following: C. H. Ostenfeld: The Land Vegetation of the Faeroes (Botany of the Faeroes, 1908), pp. 990-996 (Fjaeldmark); R. Speight, . Cockayne, and R. M. Laing: The Mount Arrowsmith District: A Study in Physiography and Plant cology, *Trans. and Proc. New Zealand Inst.*, Vol. 43, 1911, pp. 315-378 (see especially pp. 359-360); J. W. Bews: n Account of the Chief Types of Vegetation in South Africa, With Notes on the Plant Succession, *Journ. f Ecology*, Vol. 4, 1916, pp. 129-159 (see especially p. 135).

ITS CHARACTERISTIC PLANTS

On this circumscribed alpine fell-field of Mt. Marcy grow several interesting lichens. The soil-inhabiting ones are *Thamnolia vermicularis* (Fig. 4) with its white, frequently curled, quill-like thalli. The rounded cushions of the reindeer lichen, *Cladonia rangiferina,* are found; as is also Iceland moss, *Cetraria islandica.* The alpine club moss, *Lycopodium Selago,* is a fell-field plant; as also are such flowering plants as *Arenaria groenlandica, Potentilla tridentata, Cornus canadensis, Vaccinium pennsylvanicum* var. *angustifolium, Nabalus Boottii,* and *Ledum groenlandicum.* In the lee of rock ledges *Diapensia lapponica* was found growing in its characteristic cushion form. *Salix uva-ursi* is a dwarf prostrate willow. The alpine rattlebox, *Rhinanthus crista-galli,* was found in flower at the summit, along with other plants which live protected in the soil pockets on rock ledges or in the crannies and crevices of the rough angular boulders or slabs of crystalline rock which lie in confusion on the dome-shaped top. Photographs of Mt. Whiteface (4,872 feet), 16 miles north of Mt. Marcy, show

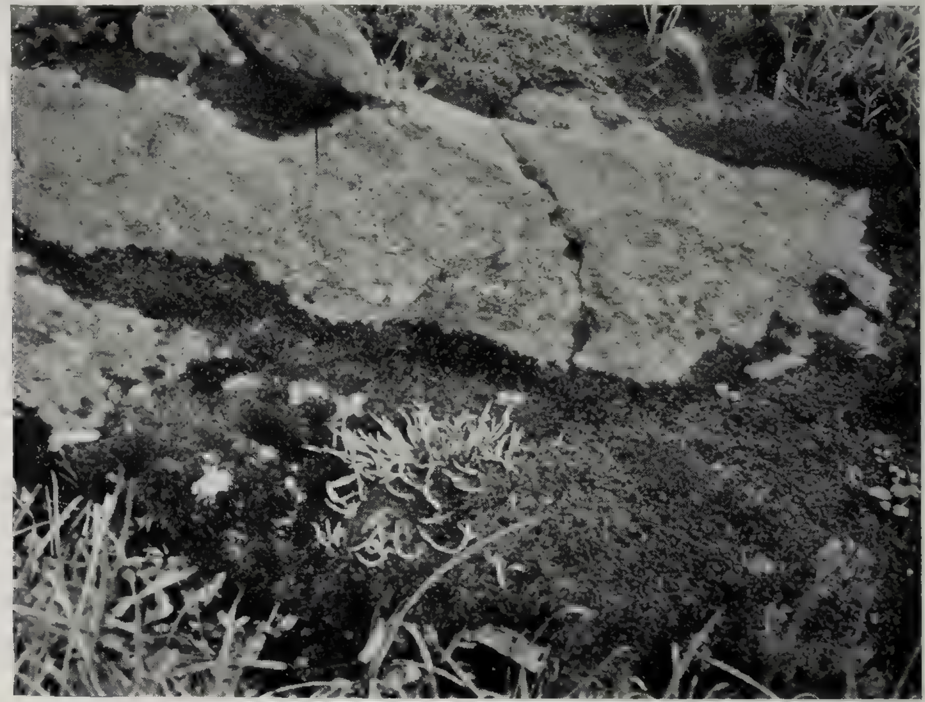


FIG. 4—The worm lichen (*contrayerba blanca*), *Thamnolia vermicularis,* growing out of a carpet of mosses found on rock ledges, head wall of Great Gulf, Mt. Washington, August 23, 1918.

similar conditions of fell-field, while Giant Mountain (4,622 feet) is not bare at the summit except where shelving rocks occur.[7]

The Fell-field on Mt. Mansfield in the Green Mountains

Fell-field may be said barely to exist on the summit of Mt. Mansfield except for the *arête,* or sharp ridge connecting the top (Chin) with the lower forest-covered parts (Nose) of the Mansfield massif.

The Fell-field on Mt. Katahdin

The top of Mt. Katahdin is an extensive plateau covered with tabular blocks or slabs of red granite, which increase in size upwards toward the West Peak, the highest point. The red granite on weathering splits into blocks more or less regular in form which strongly resemble courses of crumbling masonry. So friable is this rock that it crumbles readily, giving rise to a residual granitic soil which fills the rock crevices, rock pockets, and rock crannies as the original soil of the mountain. The slopes south from the two chief peaks are covered with loose, angular fragments as far down as the (so-called) tree line. The wind-swept balsam trees grow in the clefts between the confused, loosely piled blocks. Frost action has split these rocks into every conceivable form. The rocks of this fell-field formation are covered with the crustaceous lichen *Lecidea geographica,* whose thallus, alternately black and yellow, resembling a colored map, gives them a yellowish-green tone. Other crustaceous lichens begin as small patches and expand into mats and carpets which cover the boulders. *Tripe-de-roche, Umbilicaria* sp., as a rock lichen, accompanies the preceding form, as also several lithophytic mosses, such as *Andreaea petrophila, Rhachomitrium sudeticum,* and *R. aciculare.* The detritus produced by the wash, decay, and disintegration of the rocks, along with the organic remains of lichens and mosses, prepares a soil suitable for the reindeer lichen, *Cladonia rangiferina,* and Iceland moss, *Cetraria islandica.*

Accompanying the growth of these lichens, more material is accumulated to form a soil sufficient for the plants which characterize the alpine tundra. Here are such grasses, according to Harvey, as *Hierochloë alpina, Agrostis rubra, Deschampsia flexuosa;* such sedges as *Carex vulgaris hyperborea* and rushes as *Juncus trifidus,* accompanied by mosses such as *Mielichhoferia nitida elongata, Polytrichum commune, P. juniperinum* and *P. ohioensis.* In the ecologic succession of plants on this alpine fell-field, *Lycopodium annotinum* var. *pungens, L. Selago, Arenaria groenlandica,* and *Potentilla tridentata* appear or live side by side with the lichens and mosses above mentioned.[8] This is explained by different summit areas being in a more advanced or more retrograde stage of physiographic and edaphic development. Later the low heaths appear, some growing normally only when sheltered by some projecting slab of granite. The pioneer heaths are *Vaccinium pennsylvanicum* var. *angustifolium, V. uliginosum, V. Vitis-Idaea,* and the cushioned *Diapensia lapponica.* Of less frequency are *Ledum latifolium, Arctostaphylos alpina, Rhododendron lapponicum, Cassiope hypnoides, Loiseleuria procumbens,* and *Phyllodoce caerulea* (*Bryanthus taxifolius*).

---

[7] J. W. Harshberger: The Plant Formations of the Adirondack Mountains, *Torreya,* Vol. 5, 1905, pp. 187-194; *idem:* Phytogeographic Survey of North America (Die Vegetation der Erde, Vol. 13), Leipzig and New York, 1911, pp. 405-408.

[8] J. W. Harshberger: A Botanical Ascent of Mt. Katahdin, Maine, *The Plant World,* Vol. 5, 1902, pp. 12-28. The ascent was made by the writer on August 1, 1900.

The conditions on this table-land are very severe, and some of the plants mentioned only succeed by growing in the shelter of the granite blocks or by sending their roots down to considerable depths in the rock crannies. *Arenaria groenlandica,* with its multitude of rootlets and its branching habit, can do this, as well as *Rhododendron lapponicum;* while *Arctostaphylos alpina, Vaccinium uliginosum,* etc., grow in spreading mats.[9] Even on the summit fell-field the alpine mats are encroached upon by dwarf prostrate trees such as *Betula glandulosa* and *B. papyrifera minor,* which, gradually increasing in number as the slopes are reached, merge with the dwarf timber at the tree line, viz. the puckerbush, or *krummholz.* The scattered condition of the alpine fell-field plants is emphasized in the tufted growth of several grasses, sedges, and rushes like *Juncus trifidus* and *Scirpus caespitosus.* A number of other species are characteristic of this alpine garden, where, as the moisture content of the soil increases because of the presence of a spring or where the snow remains well into the summer months, the fell-field conditions pass over into the alpine meadow societies.[10]

Two kinds of granite are found on Mt. Katahdin, the red kind, previously mentioned, and a gray kind, composing the lower two-thirds of the basin walls. These two granites are probably ultimately of the same character. The brownish-red granite, which concerns us in this paper, has been studied by Dr. M. E. Wadsworth.[11] He notes that the feldspars are colored pink and greenish white and that the calcite and a greenish talcose mineral occur as alteration products. In their section the feldspar is seen to be altered greatly and the biotite is partly decomposed. The structure of this red granite, which covers the upper 700 feet of the mountain, has determined the character of the summit and the form of the upper slopes and therefore, directly, the distribution of the trees and the other plant life of the summit.

Fell-fields of the Mt. Washington Massif

THE REGION INVESTIGATED

The fell-field of the alpine portion of the Mt. Washington massif is the particular theme of this paper. Three days were spent by the writer on he top of Mt. Washington—July 18-20, 1903—in the investigation of its lpine flora. The survey included the summit, the slopes, the Alpine Garlen, and the head walls of the Great Gulf and Tuckerman Ravine (for ocations, see map, Fig. 2). It enabled the writer to become familiar with he general topography, geology, and vegetation of the mountain, and the fact that the Alpine Garden represented a fell-field was impressed upon him. A number of articles setting forth his impressions appeared in *Among the Clouds,* a paper printed on the top of the mountain.[12] A second visit to Mt. Washington with the specific object of photographing and studying the fell-fields was made on foot from Bretton Woods, and two days—August 23-24, 1918—were passed in a study of the vegetation of the head walls of the Great Gulf and Tuckerman Ravine, the Alpine Garden, and the fell-fields elsewhere on the summit and about the Lakes of the Clouds.

---

[9] No attempt is made in this account of fell-fields to enumerate all of the plants found on the mountains described. Only a few representative species are mentioned.

[10] L. H. Harvey: A Study of the Physiographic Ecology of Mt. Ktaadn, Maine, *University of Maine Studies No. 5,* Dec., 1903.

[11] C. E. Hamlin: Observations upon the Physical Geography and Geology of Mt. Ktaadn and the Adjacent District, *Bull. Museum Comp. Zoöl.,* Vol. 7, Cambridge, Mass., 1881, pp. 189-223; reference on p. 209.

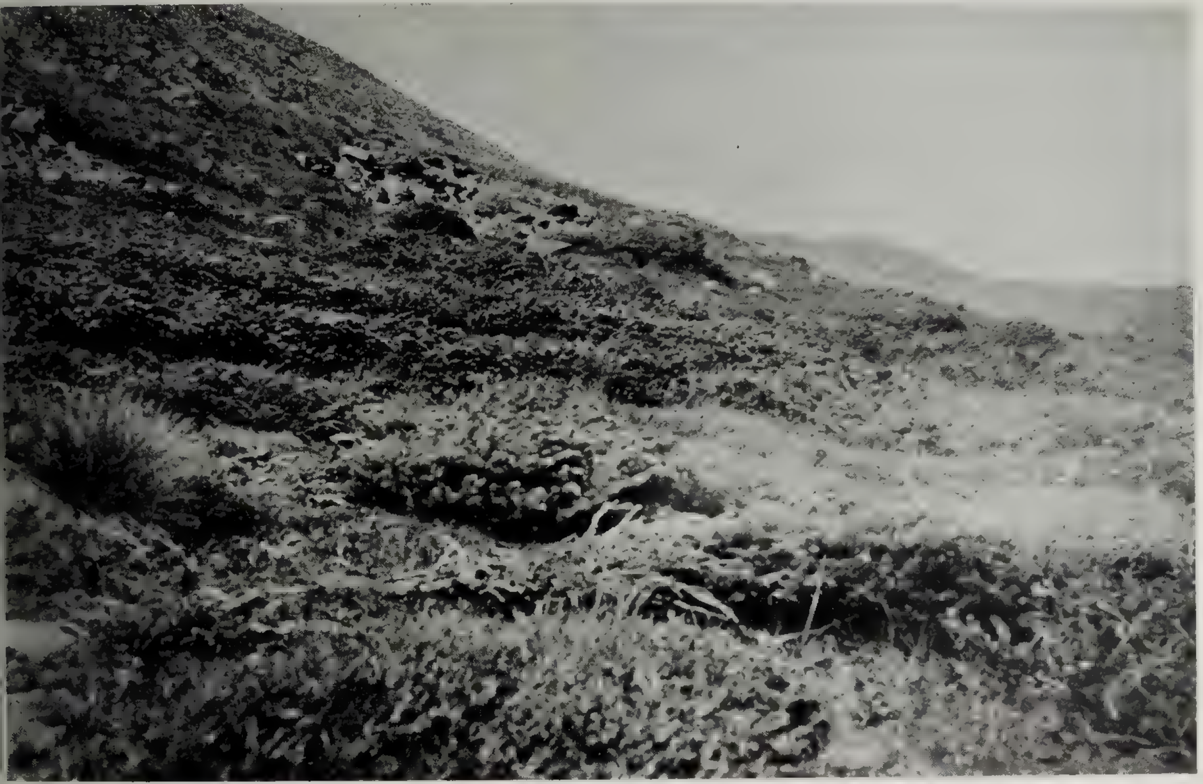


Fig. 5—Prostrate balsam trees (*Abies balsamea*) on the upper slopes of the Alpine Garden, Mt. Washington, August 23, 1918. To the left is a tussock growth of *Scirpus caespitosus.*

NATURE OF THE DOME

The summit and slopes of the dome of the Mt. Washington massif are a jumble of large slabs and boulders of granite. On the shoulders near the summit, as at the head of the Great Gulf, the coarse alpine sedges and grasses form an almost continuous sward, broken only by flat granite blocks which hardly rise above the grassy surface. Here alpine grass-meadow conditions are simulated; but the flora of these areas—an unusual condition on alpine summits—is a scanty one. Elsewhere on the alpine flanks of the dome the rocks are piled up in the greatest confusion, many of them covered with lichens and mosses. They are hoary with age and exposure to the severe meteorologic conditions. Pockets of earth are found of greater or lesser size, and great rifts in the rocks are almost cavernous in their extent. The drainage of such soils must be nearly perfect, as is evidenced by the successful growth of many alpine species which do not flourish in an ill-drained soil.

---

[12] "Our Mountain Flora," July 18, 1903; "The Great Gulf," July 23, 1903; "The Individuality of Mountains," Sept. 8, 1904.

Water Supply of Alpine Plants

The rocky surface, however, serves as a protective check against too rapid loss of water from the soil, so that by growing down deeply the roots of most alpine plants are able to get the necessary water supply, as the plants have various structural or anatomic details by which the loss of the absorbed water is more or less completely regulated. It has been the experience of gardeners that numbers of alpine plants perish if planted in the ordinary soil of our gardens. But many of these rock plants, if so placed that their roots are in a dry spot, remain in perfect health. Many plants from mountains a little farther south and from alpine regions find on walls congenial conditions for healthy growth. A wall properly constructed for the growth of alpines ensures comparative dryness in winter and assures against drought in summer. This apparent paradox is easily explained, for the heavy rains and snow water of winter will pass through a mass of broken stone more readily than through a similar body of soil, and in summer the stones of the wall prevent loss of water by evaporation. Such a wall, therefore, drains away superfluous water bu conserves the precious minimum supplies upon which alpine plants depend. Probably everyone has noticed, on removing a large stone, that th soil beneath it is moist while the surrounding soil not similarly covered i dry. So beneficial to the roots is contact with the cool stones that plant which would perish from drought in the lighter soils remain fresh an green in a rock wall under the hottest exposure, since there is moistur deep in the crevices. In the fall of the year the rock plants become thoroughly "ripened" and their tissues hardened by exposure to the heat o the sun and stones in contact with their roots, stems, and leaves.

Extremes of Temperature on Mountain Summits

Similarly the alpine fell-field is exposed to intense illumination, an the soil heats up rapidly in the daytime; but after sundown it parts wit the heat with equal rapidity, so that on a clear evening it becomes intensel cold. A similar difference is noticeable between the sunny and the shad places on high mountains, as the writer experienced on the Gorner Gra (10,290 feet) some years ago while botanizing in the Swiss Alps. Here a noonday the soil and stones on the north side of the shelter hut were frozen hard, while on the south side the soil had thawed to the depth of one or two inches, so that the larger stones could easily be removed.

ASPECT AND SOIL

Aspect, or exposure, which may be defined as the point of the compass which any sloping land faces, is of great importance in the distribution of alpine plants. This is true especially on Mt. Washington, for the head wall of the Great Gulf with its northern aspect supports a greater variety of alpine plants than the top of Mt. Washington itself. A minor feature of this exposure is seen on the flatter slopes of the fell-field proper, where the level is broken by the rocks, which provide different aspects and drier or moister positions. These rocks vary from true rock ledges through blocks, boulders, slabs, loose angular pieces, cobblestones, pebbles, etc., to coarse gravel and sand, which, sorted by glacial action, winds, snow, and rains, provide the edaphic environment of the hardy alpine plants. These comprise earth-inhabiting or rock-inhabiting lichens and mosses (lithophytes) and the soil-growing flowering plants which are able to grow because of their various root adaptations and because such plants have regulatory aërial structures to control transpiration and to adjust themselves to other influences of an alpine climate. Schröter[13] divides the plants of the fell-fields, as to their habits of growth with reference to the soil, into (1) earth-inhabiting plants (lichens, mosses, and seed plants); (2) shingle-inhabiting (seed) plants; and (3) rock-inhabiting plants (lithophytes), which include

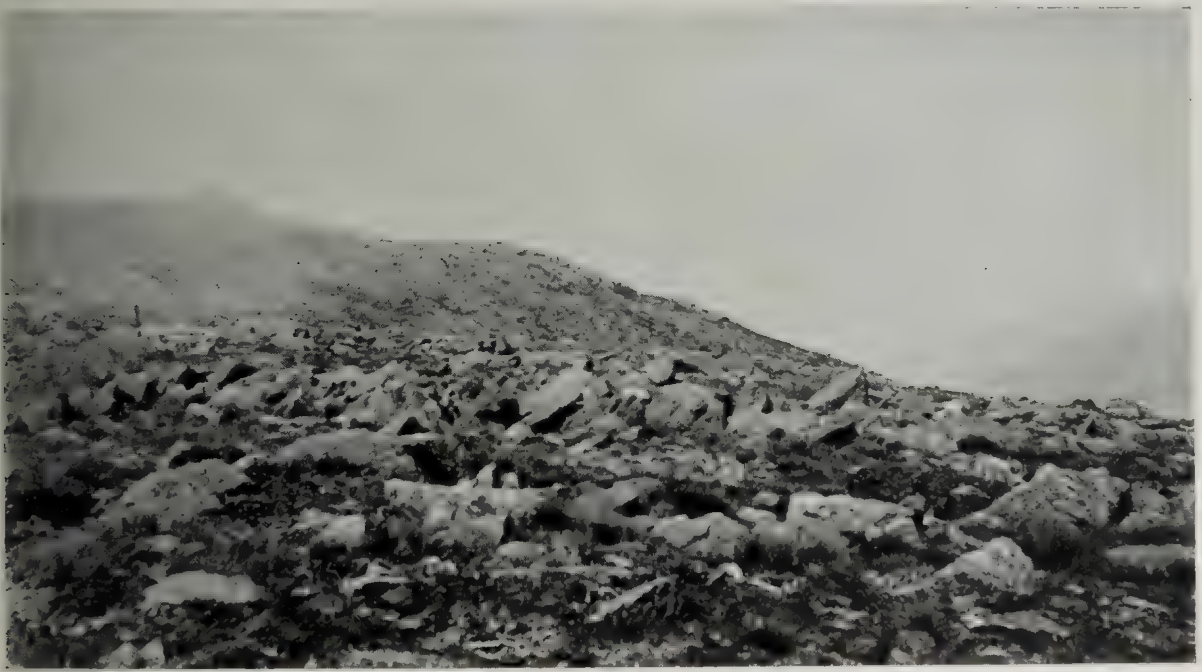


FIG. 6—Fell-field of the Alpine Garden, Mt. Washington, August 23, 1918. Note round cushions of *Diapensia lapponica* in the foreground.

---

[13] C. Schröter: Das Pflanzenleben der Alpen, 1908, p. 514.

surface-growing mosses and seed plants, crevice plants, rock-penetrating plants (lichens and mosses), and rock-attached plants (algae). The lichens and mosses have rhizoids, while the seed plants have true roots. The earth-inhabiting plants (chomophytes) may grow in clay, loam, sand, or fine gravel soils, etc. Oettli calls[14] the rock-surface plants exochomophytes to distinguish them from the preceding alpine plants and from those which accommodate their growth to the rocky clefts and fissures of the fell-field surface (chasmophytes).

Vegetation of the Mountain Shoulder near Jacob's Ladder

Having considered the general conditions of soil and aspect of the alpine fell-fields of Mt. Washington, it is next important to treat of the specific details which were investigated during the summer of 1918. Jacob's Ladder, on the mountain railroad, has long been celebrated for its trestle spanning one of the steepest grades of the ascent. Off from the trestle there is a relatively flat place formed by a projecting shoulder of the mountain. Large slabs of granite are piled up in a cairnlike ridge, and behind this pile of rocks low, spreading, wind-swept balsam trees, *Abies balsamea,* are found, the tops of the trees just reaching to the crest of the lichen-covered rocks (Fig. 3). Here the Labrador tea, *Ledum groenlandicum,* forms extensive masses of low shrubbery, as likewise do the low and spreading bushes of the bog bilberry, *Vaccinium uliginosum,* and the still more dwarfish low, sweet blueberry, *Vaccinium pennsylvanicum* var. *angustifolium,* together with the low creeping stems of the mountain cranberry, *Vaccinium Vitis-Idaea,* with its erect branches and dark red berries in late summer shining between the dark, evergreen leaves. The roots of these three plants are specialized in the possession of endotrophic mycorrhiza, which, some botanists have suggested, absorb the nitrogen of the air and assimilate it. The crowberry, *Empetrum nigrum,* is a many-branched undershrub seldom over two feet tall and with many earth-creeping stems covered with numerous short awl-shaped leaves of the ericoid type. It forms dense, dark green, cushion-like growths. Tufts of *Lycopodium annotinum* var. *pungens* are scattered between the rocks on the level places, together with the rounded pincushion-like plants of *Diapensia lapponica.* The three-toothed cinquefoil, *Potentilla tridentata,* the bunchberry, *Cornus canadensis,* and the creeping snowberry, *Chiogenes hispidula,* sending out long, running shoots over the bare ground or over the moss-covered rocks, contribute their growth to the Japanese garden effect of the vegetation of this mountain shoulder. One other plant growing out of the moss cushions is a noteworthy cosmopolitan lichen, *Thamnolia vermicularis* (the worm lichen), found also by the writer in moss carpets of the head wall of the Great Gulf (Fig. 4). The chalk-white, cylindrical, twisted podetia of this lichen suggest the name applied to it by the mountaineers of the Peruvian Andes, *contrayerba blanca.*

---

[14] M. Oettli: Beiträge zur Ökologie der Felsflora (Zurich Polytechnic Institute thesis), Zurich, 1905.

astilleja pallida var. *septentrionalis,* the white painted cup, is a perennial rowing out of the rock crevices. The true alpine club moss, *Lycopodium elago,* also occurs here.

VEGETATION OF THE ALPINE GARDEN

Climbing down the treacherous rocks below the hotel on the top of the ountain to the plateau known as the Alpine Garden, about a thousand eet below, abundant masses of the Labrador tea, *Ledum groenlandicum,* vere found filling up the flatter depressions between the blocks of granite, vhich appear as if they had slipped down the mountain side. *Phyllodoce aerulea (Bryanthus taxifolius)* is a low, alpine, heathlike undershrub, vhich is more abundant on these mountain slopes between the granite oulders than on the declivities of the Great Gulf, where it was collected y the writer in 1903. Here also the interspaces of the rocks were occupied by the low shrubs of the bog bilberry, *Vaccinium uliginosum,* with ts twisted stems prostrate between the rough boulders. Occasionally on he descent patches of meadow sweet, *Spiraea latifolia,* in full flower were assed, contributing their quota to the rock-garden effect. The upper slopes f the Alpine Garden are covered with dense tangled thickets of balsam rees, *Abies balsamea,* which form the puckerbush, dwarf timber, or *krumm-*

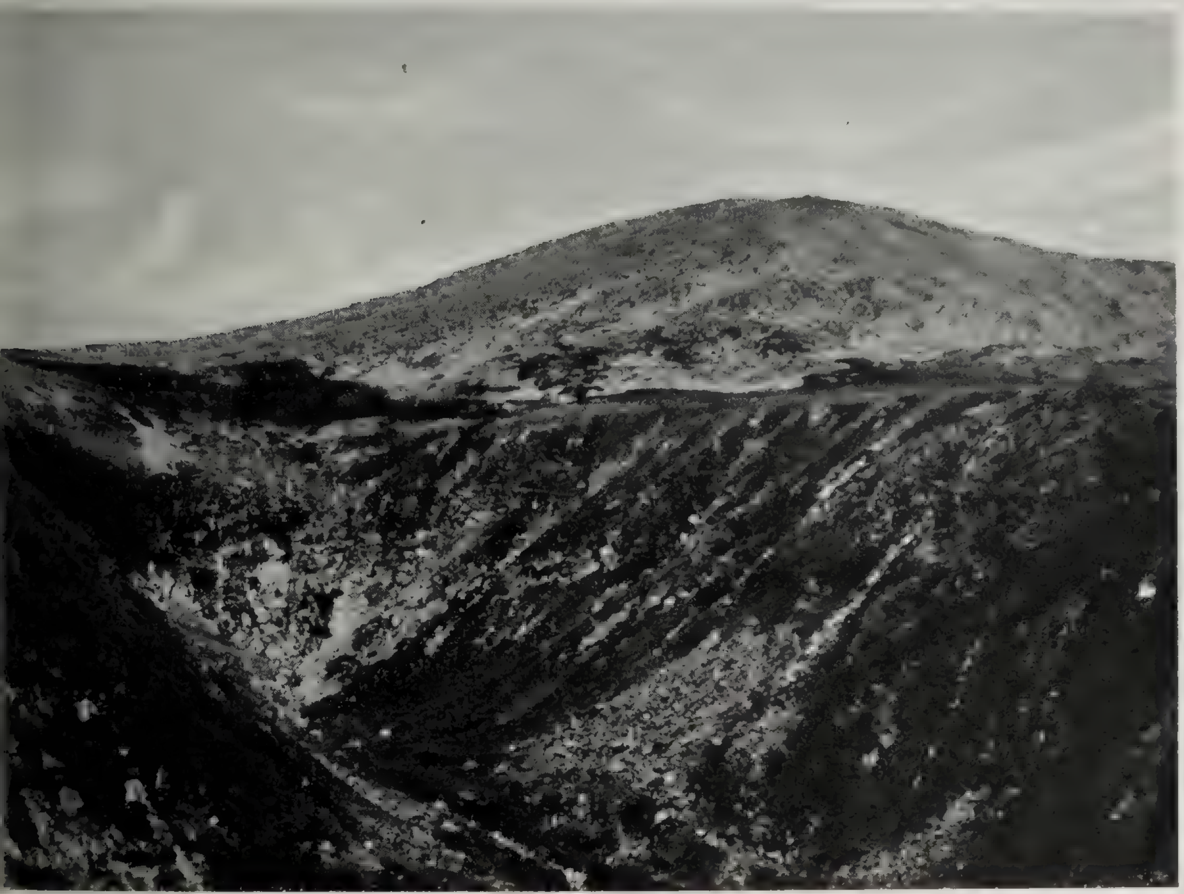


FIG. 7—The summit dome of Mt. Washington seen across Tuckerman Ravine. The intervening platrm is the Alpine Garden, terminating in Lion Head in the right foreground. Notice the flat shelf on e left connecting the Garden with the shoulder between Mt. Washington and Mt. Monroe.

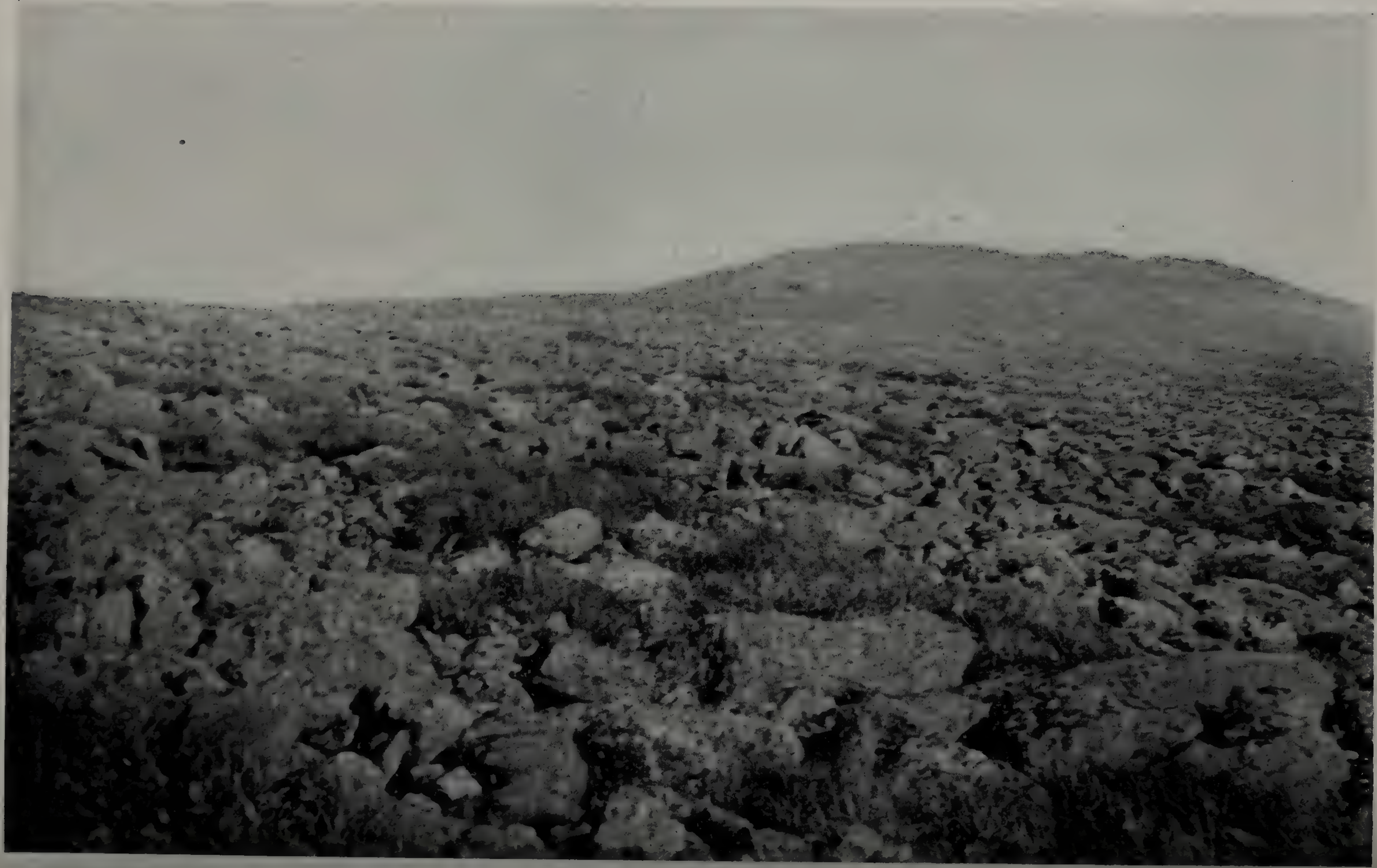


FIG. 8—Typical fell-field in the saddle between Mt. Washington and Mt. Monroe, looking toward Boott Spur (about 5,500 feet), August 23, 1918. Note the coarse grasses and other alpine plants between the slabs of granite.

olz (Fig. 5) through which the writer forced his way or over the tops
whose interlaced branches he walked without slumping through. Balsam
ees at the elevation of the Alpine Garden (5,500 feet) rarely produce
ed. Reproduction depends not only on seeds blown up from below but
ainly on the layering of the trees. The roots always develop from the
rostrate branches, and the branches so layered often develop as inde-
endent trees by the decay of the connecting branch. Cones are born spar-
gly at 4,900 feet, and even here reproduction by layering exists. The
rub forms of balsams extend down to 4,500 feet, while the trees of
erchantable size begin to appear at 4,000 feet. On the alpine stretches of
e Presidential Range the dwarf trees are very shallow-rooted, needing
ly a mossy bed for the seeds to germinate. The balsam can grow almost
bare rocks, if it starts its growth in a mossy cushion covering the rock.
here are some bare areas here where the balsams do not grow (Fig. 5),
nd these are characterized by cushions of the alpine willow, *Salix herbacea,*
nd tussocks of the dense, stiff, erect wirelike stems of the sedge *Scirpus*
espitosus.

Along Six Husbands Trail, which crosses the flatter portions of the
lpine Garden plateau (Figs. 6 and 7), we find the fell-field vegetation to
nsist of numerous low cushions of *Diapensia lapponica,* the basketlike
rowths of *Phyllodoce caerulea,* and the isolated clumps of the white
ainted cup, *Castilleja pallida* var. *septentrionalis,* one of the few plants
flower late in August, 1918. Here also are tufts of bitter cress, *Car-*
amine bellidifolia var. *laxa,* in fruit. The reindeer lichen, *Cladonia rangi-*
rina, reminded one of its cosmopolitan distribution in the high North,
here it forms one of the important foods of the Lapland reindeer. The
undheaded clumps of *Rhododendron lapponicum* relieve the rocky sur-
ace. Near the end of Six Husbands Trail the source of the stream which
escends through Tuckerman Ravine is found in wet places, fed by springs
hich emerge from the loosely piled rocks of the massif above. Here are
umerous plants of the green hellebore, *Veratrum viride,* growing out of a
hagnum carpet, while the cold spring water is characterized by masses
f some bright-green filamentous alga.

CONDITIONS OF SADDLE BETWEEN MT. WASHINGTON AND MT. MONROE

The depression of the Presidential Range between Mt. Washington and
t. Monroe flattens out into a plateau, or fell-field (Fig. 8), which is the
urce of two important streams rising in springs which gush from the
osely piled blocks of granite. The source of the Tuckerman Ravine affluent
f the Cutler River (Fig. 7), feeding Hermit Lake in the bottom of the
avine, has been noticed as being on the east side of the range. On the
estern side the volume of the springs is sufficient to supply two mountain
rns, known as the Lakes of the Clouds, the outlet of which is the source
f the Ammonoosuc River. Near this outlet stands the new Appalachian

Mountain Club Hut, formally opened on August 7, 1915. This plateau holds the Lakes of the Clouds, and the mirrorlike surfaces of their waters reflect the rocky shores and the mountains in the background. The plateau is really a continuation of the Alpine Garden, which terminates in the Lion Head above Tuckerman Ravine (Fig. 7). Northeastward the Alpine Garden is bounded by Huntington Ravine. The elevation of this plateau is between 5,000 and 5,500 feet, for its surface is undulating in its extent from Huntington Ravine around the head of Tuckerman Ravine to Boott Spur and the eastern slopes of Mt. Monroe. Here, as along the upper slopes of the Alpine Garden, the dwarf timber, or puckerbush, pushes up the mountain in favorable protected places so that, as the photographs show (Figs. 3 and 5), the absolute timber line, represented by the extension upward of the dwarf prostrate balsam, *Abies balsamea,* is not many hundred feet below the top of Mt. Washington. Descending from the hotel on the summit of the mountain, just before the more level Alpine Garden was reached, the writer had to force his way through the dwarf timber. In some cases he walked some distance on the tops of the prostrate trees, in accomplishing which feat he recalled Thoreau's account of a similar trip up Mt. Katahdin.[15]

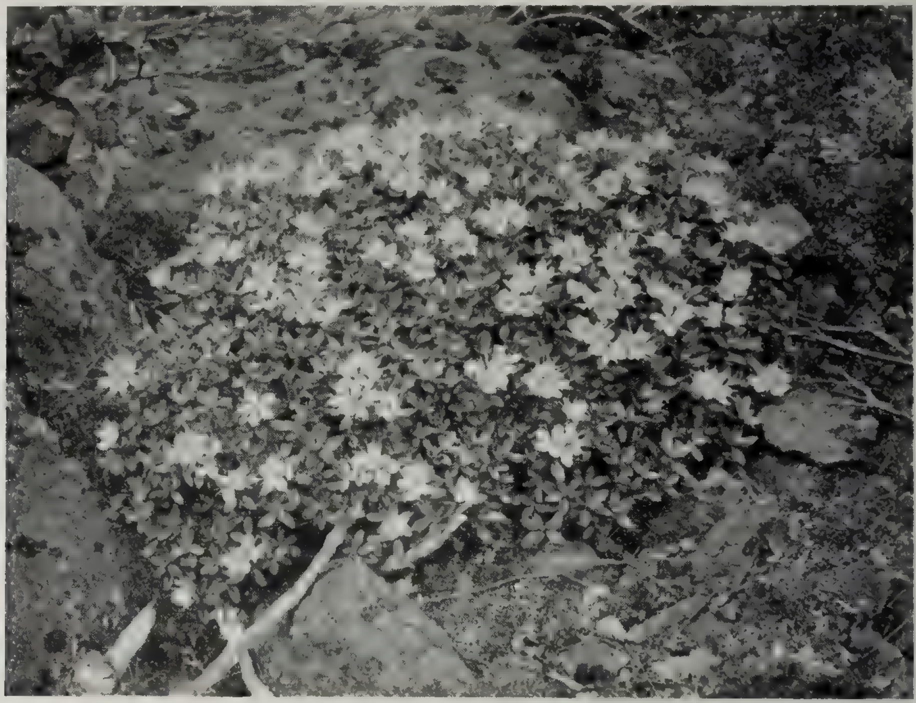


FIG. 9—Rounded shrub of Lapland rosebay (*Rhododendron lapponicum*) in flower on fell-field, Mt. Madison, N. H. (at 5,000 feet), June 25, 1917. (Photo by Ralph E. Cleland.)

As one looked along the saddle towards Boott Spur and Mt. Monroe the spaces between the rocks were seen to be occupied by rushes, sedges, and grasses (Fig. 8). Several species of the genera *Carex, Juncus,* and *Scirpus* were noted, either in isolated cushions (tussocks) or covering an extended soil surface and giving rise to a dry alpine meadow.[16] On Mt. Washington *Scirpus caespitosus* is one of the most important of the tussock sedges. Few alpine plants grow amongst the tough, wiry, grasslike plants. Off from the grassy stretches were found masses of *Salix herbacea,* as well as the rounded cushions of *Arenaria groenlandica* and *Rhododendron lapponicum* (Fig. 9) in full flower on August 23, 1918. Here, as the western slopes of the saddle were approached, were found isolated clumps of balsam trees spread over the rocky fell-field.

---

[15] H. D. Thoreau: The Maine Woods, Boston, 1864, p. 61.

Bryophytes form, as in Iceland, a prominent part of the vegetation of this rocky flat. The dry flat is often poor in plants and occasionally devoid of vegetation. The mosses occur in scattered cushions, especially around somewhat large stones, where they can hold fast and find some shelter. In somewhat damper and less exposed areas moss heaths are developed, as on the lava fields of Iceland. On somewhat damper ground, especially where large blocks lie scattered and afford shelter, the mosses become richer and form a continuous carpet. As on the slopes of the head wall of the Great Gulf, there are places on this saddle where the creeping stems of *Salix herbacea* are interwoven in a dense moss carpet, so that only the tips of the moss shoots project above the carpet. Helgi Jónsson has called attention to somewhat similar conditions on the rocky flats of Iceland.[17] On dry stony tracts there often occurs a continuous, though circumscribed, growth of mosses. Here the higher plants grow scattered without giving character to the vegetation. These areas, as in Iceland where they are more extensive, may be called moss heath patches. By the decay of the mosses a humus layer is gradually formed.

Fell-field about the Lakes of the Clouds

The fell-field about the Lakes of the Clouds is characterized by a richer alpine flora than elsewhere; and, because of the larger amounts of permanent soil water, not only does the number of individuals of any one species increase, but also the number of species is augmented considerably. The shores of the two alpine tarns are rocky, with scattered blocks and slabs of granite, and at several places the rocks are shelving and precipitous (Figs. 10 and 11). The clear cold water of the lakelets, derived from springs beneath the rocks, does not support the usual aquatic plants. Similarly, the high alpine lakes of the Swiss Alps are devoid of flowering plants. In his enumeration of the vegetation of the lakes of the region of the Bernina Pass, Rübel[18] does not mention any of the higher plants but only diatoms, blue and green algae, which can perform their functions in the icy waters of these alpine tarns. The shores of the Mt. Washington lakelets, where the presence of large boulders does not prevent, are bordered by cushioned mosses and low, overhanging, prostrate shrubs and trees.

---

[16] J. W. Harshberger: Phytogeographic Survey of North America (Die Vegetation der Erde, Vol. 13), Leipzig and New York, 1911, p. 377.

[17] The Botany of Iceland (Rosenvinge and Warming, edits.), Part II, Copenhagen and London, p. 591.

[18] E. Rübel: Pflanzengeographische Monographie des Berninagebietes, *Botan. Jahrbuch*, Vol. 47, 1912, pp. 1-616.

The flat places along the east shore of the upper lake are covered with cushions of mosses, some of a light-green color (Fig. 10). Rooting through these mosses, which are associated with light gray patches of the reindeer lichen, *Cladonia rangiferina,* we find the bog bilberry, *Vaccinium uliginosum,* in low, spreading bushes, and the crowberry, *Empetrum nigrum* mixing its growth with that of the low, narrow-leaved blueberry, *Vaccinium pennsylvanicum* var. *angustifolium,* while out of the sphagnum, which in some places forms the boggy shore line, grows the yellow mountain avens, *Geum* (*Sieversia*) *Peckii,* with its flowers bending over the water's edge (Fig. 11). Sprawling over the flatter boulders, beside which its roots extend into the rock crevices, we find the graceful dwarf birch, *Betula glandulosa,* which ranges north to the Arctic regions, and nearby the Labrador tea, *Ledum groenlandicum,* forming low dwarf clumps of spreading bushes. *Lycopodium annotinum* is found here, and the green hellebore, *Veratrum viride,* forms societies in damp, boggy places with its light-green foliage outlined against the dark-green mosses of the prostrate, wind-swept balsam trees and protected from the wind by some large projecting mass of rock (Fig. 11).

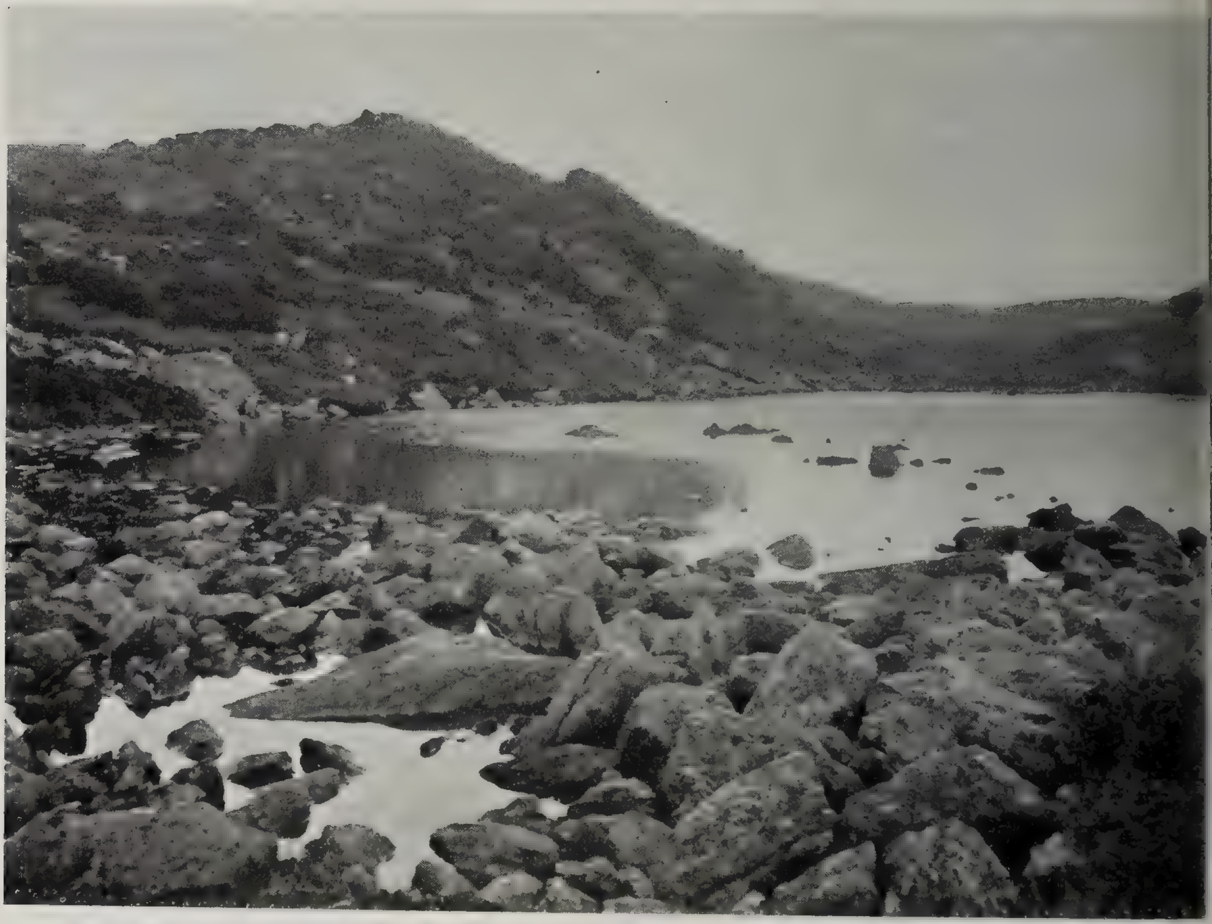


FIG. 10—Upper tarn, Lakes of the Clouds, Mt. Washington, August 24, 1918. The low shrubs on the slopes of the fell-field above the lake are seen in the background. The outlet is in the foreground.

Cushions of hair mosses, *Polytrichum*, vary the colors of the fell-field egetation along the shores of the upper lake, as do meadow-sweet, *Spiraea atifolia,* bunchberry, *Cornus canadensis,* and mayflower, *Maianthemum anadense.* The outlet of this tarn (Fig. 10) is by a channel which leads o the edge of the head wall of the Ammonoosuc Ravine. In late summer his outlet is dry, but the rounded cushions of hair mosses, separated from ach other by narrow or wide spaces, indicate the direction of the overflow hannels in wet weather. The west shore of the upper lake is more precipitous, the strongly fissured ledges rising vertically from the water. Among the rock mosses grow twisted balsams, *Abies balsamea,* spreading outward over the flatter places. A few of these dwarf trees have twisted trunks as large as a man's leg. The less rocky slopes are covered with low bushes of the Labrador tea, *Ledum groenlandicum,* and bog bilberry, *Vaccinium uliginosum,* while on the flat, bare soil spaces hereabout are cushions of *Diapensia lapponica,* reindeer lichen, *Cladonia rangiferina,* spreading growths of mountain cranberry, *Vaccinium Vitis-Idaea,* with red fruit. Spreading masses of crowberry, *Empetrum nigrum,* also contribute their quota to the vegetable covering of the fell-field, where the boulders support various rock-growing lichens, such as *tripe-de-roche, Umbilicaria.* The rifts or depressions between two of the large boulders

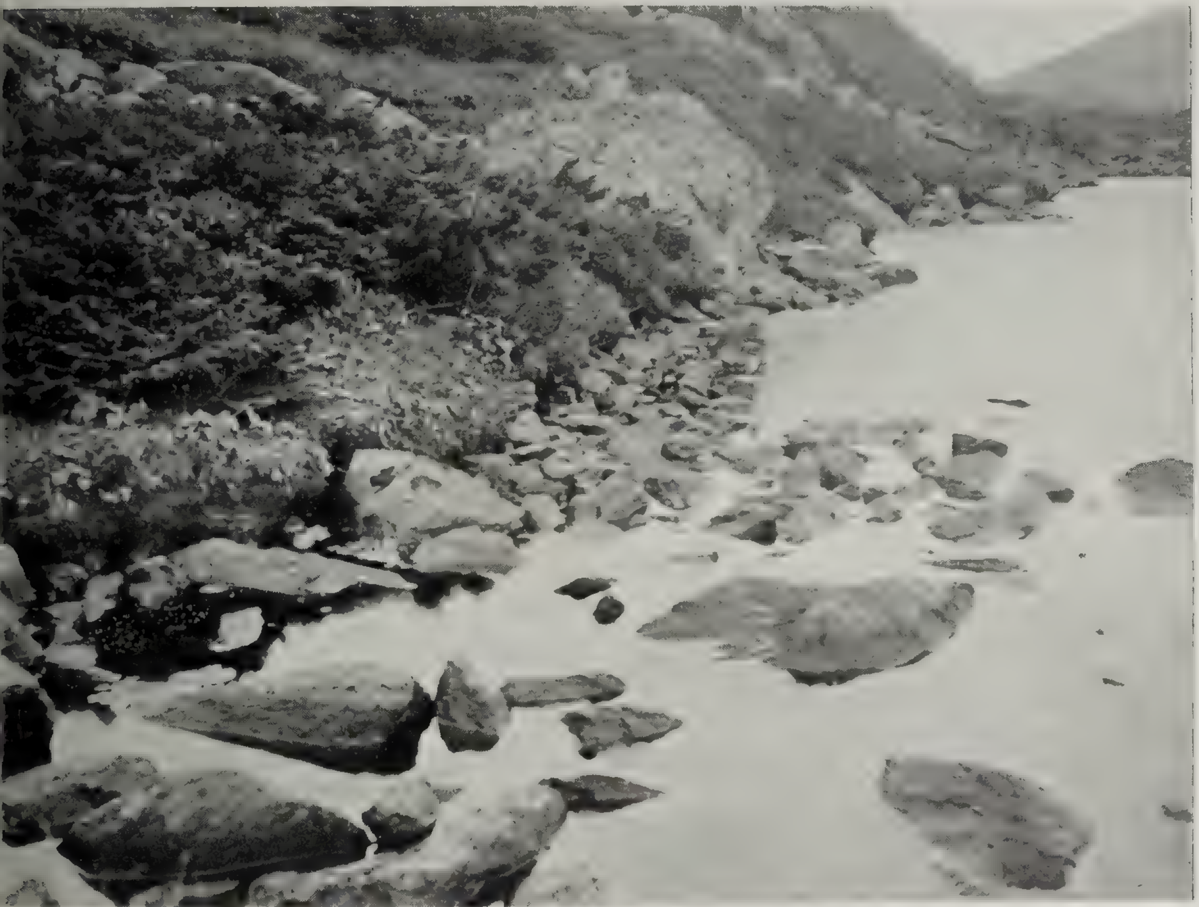


FIG. 11—Lower tarn with prostrate balsam trees fronted by moss cushions of the moss bog and the loose rocks of the lake shore. Lakes of the Clouds, Mt. Washington, August 24, 1918.

are characterized by the bunchberry, *Cornus canadensis, Clintonia boreali* *Vaccinium pennsylvanicum, V. Vitis-Idaea,* and *Potentilla tridentata.* A especially deep rift protected the dwarf mountain birch, *Betula pumil* which scarcely reached to the top of the boulders between which it gre

The slopes of the fell-field around the lower lake are less steep. In lat August a stream of crystal water issued forth among the rocks as its outlet Over this outlet stream spread the branches of dwarf balsams, dwar birches, *Betula glandulosa,* dwarf willows with dark-green, lustrous foliage *Salix phylicifolia.* Bog bilberry, *Vaccinium uliginosum,* hangs over th stream of water as it gurgles among the rocks and among mossy cushion of *Polytrichum* and *Sphagnum,* out of which grows the yellow mountai avens, *Geum Peckii.* Here are also tufted growths of *Arenaria groenlandica* (Fig. 12) among the rocks, and the photograph shows how th rocks are arranged in forming the surface of the alpine fell-fields hereabout. *Salix argyrocarpa* also fringes the outlet stream as a low, spreading shrub, and nearby is *Salix uva-ursi.* The shore line consists of soft beds of *Polytrichum, Sphagnum,* and other alpine mosses. Out of them grow bluets, *Houstonia caerulea* var. *Faxonorum,* gold thread, *Coptis trifolia* *Viola palustris,* with round cordate to reniform leaves and pale lila flowers, and the yellow avens, *Geum Peckii.* Other flowering plants occu in season.

Alpine Moss Bogs

Near where the principal spring which feeds the lower tarn issues forth, and in places around its shore, we find repeated on a small scale the moss bogs of Iceland (Icelandic, *dý*) described by Helgi Jónsson.[19] In Iceland they are bright-green moss carpets around and below the place of issuance of a spring, and they form one of the most frequent and characteristic plant communities of arctic and subarctic regions. Grönlund (1877) was perhaps the first ecologist to call attention[20] to the mats of green mosses along small streams on mountain sides. Moss bogs, which have their counterpart on a small scale around the Lakes of the Clouds on Mt. Washington, develop in Iceland on muddy soil in all places where water emerges as a spring. They occur on mountain slopes, at the bottom of valleys, and also at higher levels on rocky flats. There the mosses grow scattered in bright-green patches differing greatly in size and conspicuous even at a distance by their color, which is distinct from that of the deeper greens of the surrounding plants. These mosses on Mt. Washington, as in Iceland, are subjected to the influence of cold, well-aërated water, which determines the character of the plant associations. During the summer the low temperature of the water, also influenced by evaporation from the moss surface, acts as a check to the growth of the higher plants and is, erefore, indirectly favorable to the moss vegetation. The distribution of osses and the higher plants is also due to the character of the substratum -whether gravelly or muddy.

---

[19] Work cited in footnote 17.

[20] Chr. Grönlund: Islandske Naturforhold, *Tidsskr. for populaere Fremst. af Naturvidensk.,* 5 R, Vol. 4, 1877, pp. 321-356.

Conclusion

In conclusion the writer believes that comparative ecologic studies, such s this, are important for the classification of our knowledge concerning e fundamental units of vegetation the world over. We have reached a stage in our investigations where it is profitable to compare American plant formations with those of Europe and other parts of the world. The writer has attempted to make this correlation with reference to the fell-field formation, and in another place he has made a comparative study of American and European heaths and pine heaths.[21] Few papers have hitherto appeared in which such comparisons have been made. This field of research is one that promises substantial progress in our elucidation of the problems confronting us in a study of American units of vegetation. The three international phytogeographic excursions have done much to stimulate this kind of comparative investigation, and those which will follow will undoubtedly stimulate the same kind of inquiry.

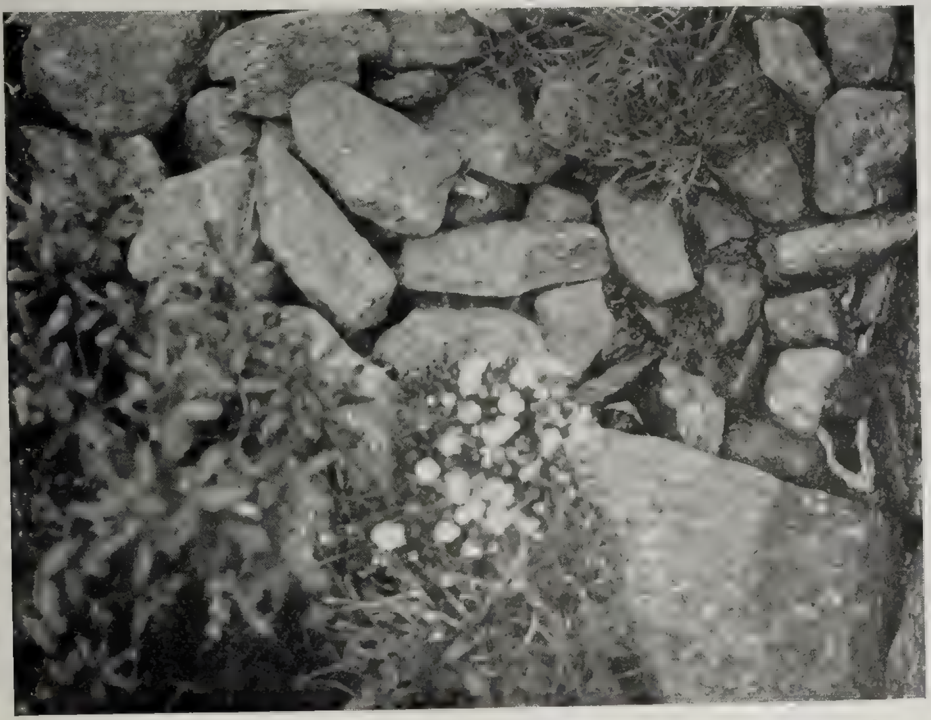


FIG. 12—*Arenaria groenlandica* as a cushion plant in flower growing out from the crevices of the loose rocks of the fell-field near the outlet of the lower Lake of the Clouds, August 24, 1918.

---

[21] J. W. Harshberger: American Heaths and Pine Heaths, *Brooklyn Botanic Garden Memoirs*, Vol. 1, June 6, 1918, pp. 175-186.

AIR ROUTES TO AUSTRALIA

By **GRIFFITH TAYLOR**
Commonwealth of Australia Bureau of Meteorology

Lord Montagu, the authority on aëronautics, in a recent lecture on world air routes has said:[1]

> It is clear that meteorology and the study of wind currents is going to be of supreme importance. The knowledge of the world's atmospheric conditions and accurate forecasts, apart from their inherent scientific interest, may effect the saving or spending of millions of money annually, when postal and commercial aviation is established.

The advent of steam has decreased the economic importance of surface winds and currents, but the sailing ships in the Australian trade are still bound by weather laws and have only one route. They come from Africa to Australia, but return to Europe via Cape Horn. The reverse route, though possible, involves permanent head winds and unfavorable currents which remove it from the regions of economic trade. Much more will the air routes depend on the variations of weather and climate.

UPPER AIR STUDIES IN THE PAST

The study of surface winds and of the general circulation of the atmosphere dates back to very early times, but it was first put on a firm basis in 1856 by Ferrel's and Maury's treatises. The first experimental investigations of upper currents, apart from the study of clouds, volcanic banners, etc., were made about 1890, and a little later the Hargrave box kite (invented in Australia) was used profitably in America for this purpose.

It is only in the last twenty years, however, that the exploration of the upper air has been carried out at all generally, but now research is world-wide. For instance, in 1911 Simpson first sent up sounding balloons in Antarctica (where the writer was initiated), and in 1913 and 1914 the upper air of Australia was investigated in the same way at Melbourne. The conditions over the northern regions of Australia are almost unknown, and we depend on Java for any knowledge that is available.

Like so many scientific experiments their immediate practical value was not obvious to the man in the street. Now that aviation, however, has come into its own, these explorations of the upper air have already proved of value. The United States government has devoted $100,000 to meteorological research connected with military aviation; and it is to be hoped that the military and political authorities of Australia will in the future show more interest in the matter than they have shown hitherto.

---

[1] Lord Montagu: The World's Air Routes and Their Regulation (Paper Read Before the Aeronautical Society, June 21, 1917), *Flight*, No. 444, Vol. 9, 1917, pp. 653-659, London.

THE MOST FEASIBLE ROUTE TO AUSTRALIA

Let us now see which are the most promising routes to this isolated ontinent. The writer has given the matter considerable attention in his ectures at the Commonwealth Aviation School. In Figure 1 is given a omewhat unusual world map (on Sylvanus' projection) where the position of Australia with regard to the other continents is well brought out. Though the edges of the map are necessarily distorted, it shows us that Australia is situated in the center of the largest expanse of water in the world, which we may term the Pacifico-Indian Ocean. This sheet of water is itself surrounded on all sides by land except to the south of Africa (for Antarctica entirely shuts off the waters to the south of Australia) and will for long prove an obstacle to flights from most of the continents.

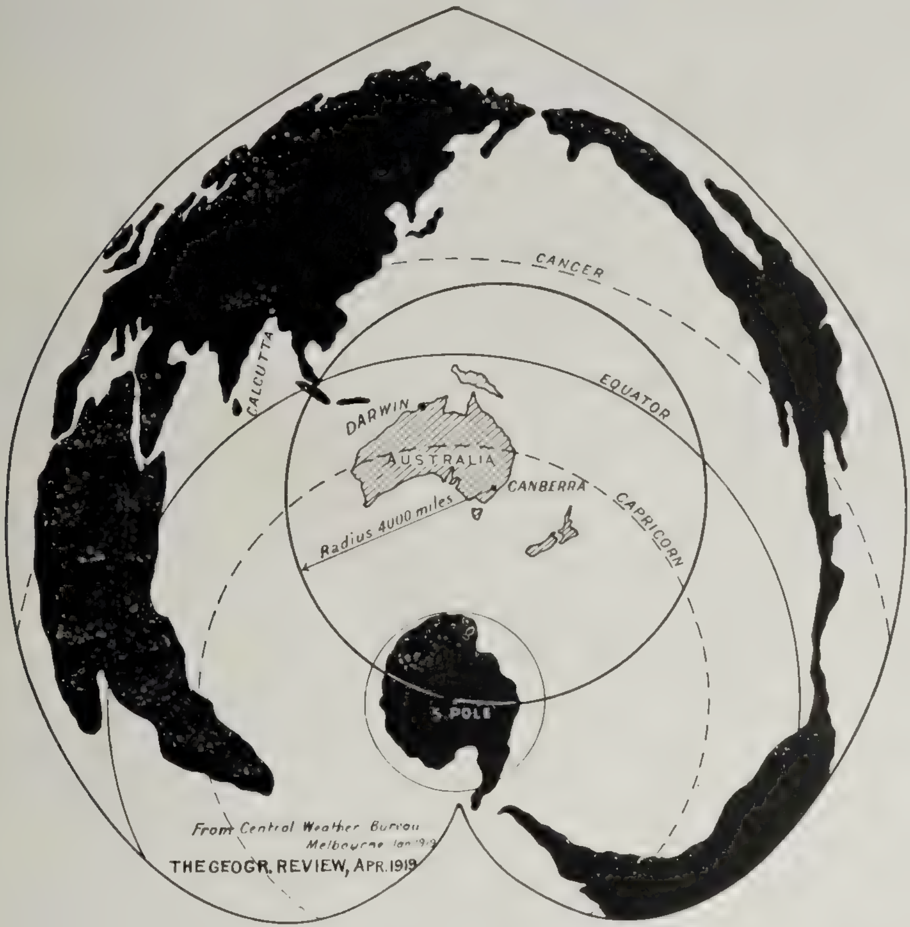


FIG. 1—World map on Sylvanus' projection showing the isolation of Australia. Scale, 1:292,500,000.

If we draw a circle of 4,000 miles radius from Canberra (which is happily placed almost at the center of population of Australia), we find that it passes directly through Antarctica (near the South Pole) but includes none of the other large land masses. The nearest continent is therefore of little use as a flying station. Africa and the Americas are ruled out by distance; they are separated from Australia by 7,000 miles of water with but few islands in most directions. There remains, therefore, Asia; and it is by way of India and the Straits Settlements that the first airplane services may be expected to travel. We have all read of th recent flights from England to India; they were accomplished with comparative ease in about four days. Such flights will soon become almost weekly occurrences.

STATIONS BETWEEN CALCUTTA AND CANBERRA

Nature has placed stepping-stones from India to Australia in the form of the drowned volcanic ranges, which are, of course, the islands of Sumatra, Java, and Timor; and these lead directly to Port Darwin, the chief settlement on the northern coast of Australia. I have drawn up a list of stations for an air route from Calcutta to Canberra with their distances. At all of these, except perhaps Koepang and Mataranka, there are, I believe, stores of petrol and facilities for repair (see Fig. 2).

As regards the time occupied, Lord Montagu in his paper on world air routes assumes about 1,200 miles a day as the average passenger-plane speed. Mr. G. Holt Thomas in a recent lecture before the Aeronautical Society of Great Britain[2] showed a map of the world crossed by air routes, where Sydney is only five days from England. This is twice as rapid as the recent flights and is probably much more rapid than the earlier services are likely to accomplish regularly. I have assumed 1,500 miles in 24 hours, which makes it about four days from Calcutta to Canberra, in case of favoring winds.

First Day		
Calcutta to Rangoon, Burma	650	miles
Rangoon to Bangkok, Siam	350	
Bangkok to Penang, Malay States	580	
	1,580	
Second Day		
Penang to Singapore, Malay States	350	
Singapore to Batavia, northwestern Java	560	
Batavia to Banjoewangie, southeastern Java	520	
	1,430	
Third Day		
Banjoewangie to Koepang, Timor	680	
Koepang to Port Darwin (only oversea stage)	500	
Port Darwin to Mataranka (suggested inland capital, Northern Territory)	250	
	1,430	
Fourth Day		
Mataranka to Cloncurry	600	
Cloncurry to Longreach	300	
Longreach to Brisbane	600	
	1,500	
Fifth Day		
Brisbane to Sydney	500	
or		
Brisbane to Canberra	600	
or		
Brisbane to Melbourne	900	

---

[2] G. H. Thomas: Commercial Aeronautics (Paper Read Before the Aeronautical Society, May 30, 1917), *Flight*, No. 440, Vol. 9, 1917, pp. 536-543, London.

The Trade Wind as a Factor

Let us look more particularly into the meteorological factors on this oute. It lies almost entirely in the monsoon and trade wind region, whose limates differ materially from those to which most of us are accustomed.

The trade wind is a surface wind blowing from the southeast (over ustralia) to the equator (see Fig. 3). Its limits vary during the year, or the belt is farther north in winter than in summer, moving with the un. In the southern winter (July) these winds reach the equator, that s almost to Singapore, and will obviously hinder the airplane coming from ndia but will help the return flight. In the southern summer (Fig. 2) heir influence is not felt much north of the Tropic of Capricorn, and only he last day's journey from India will be affected. In the northern hemiphere the trade winds blowing from the northeast will be cross winds in January and will be obliterated in July by the periodical monsoons.

Very little research on the limits of the trade winds either in height or n latitude has been done in the southern hemisphere, but the following notes embody what is available.

The trade wind in northern Queensland blows on an average about 20 miles an hour for weeks at a time, but its velocity is probably less in other portions of its belt. This steady drift can obviously affect very considerably the velocity of the plane. The layer of the trade wind is, however, of limited thickness, for above it blows a poleward return wind. This is reached about 12,000 feet above sea level near the tropics (according to German data) but is lower in temperate regions. It is often reached in ascending 4,000 feet above Melbourne, and high regions like Mt. Kosciusko experience the west wind very frequently. We know nothing directly of its depth in the Australian tropics.

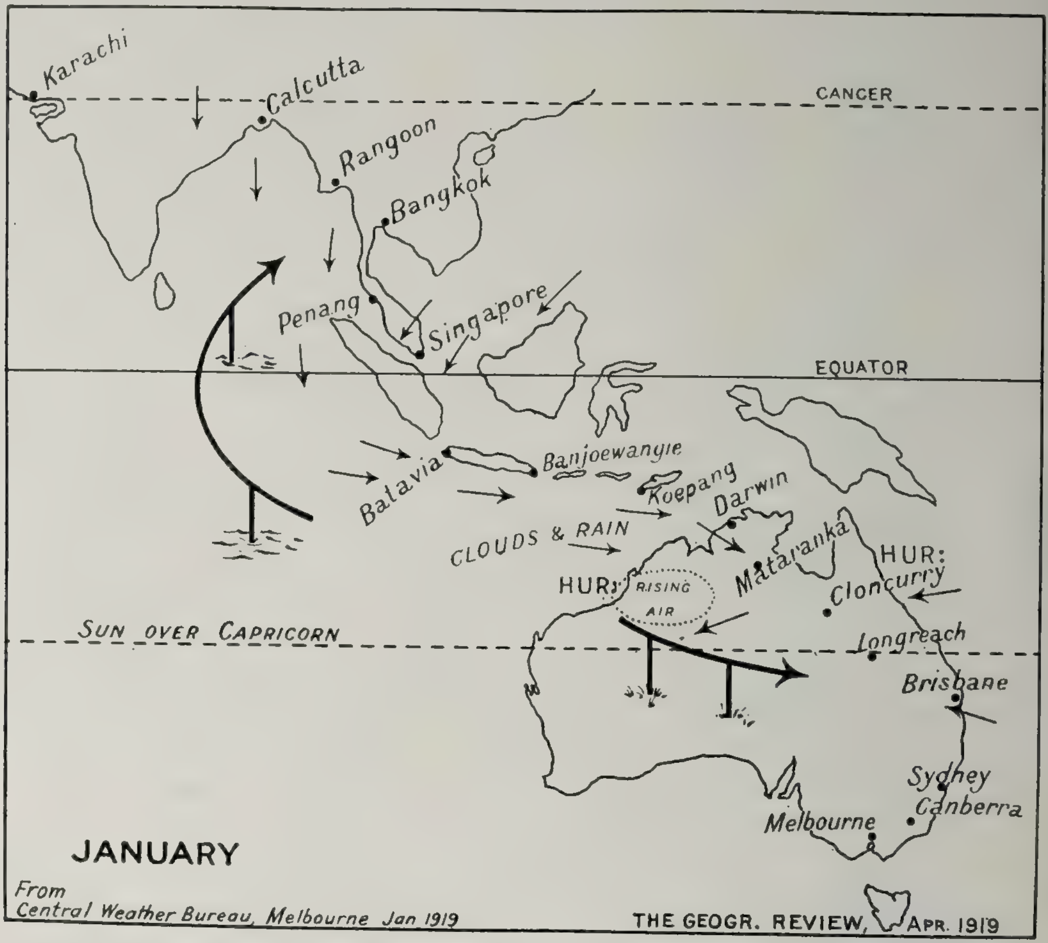
These heights mentioned are quite those of the regular flight zones. Hence our air captain will doubtless fly from the equator to southern Australia at high levels when the surface winds in July are against him, in this permanent anti-trade region. At these elevations wind forces are much stronger, for there is little friction due to obstructions or turbulent eddies at heights above a mile. For instance, at the upper flight limit the winds in temperate latitudes have an average of about 60 miles an hour.

The Monsoon as a Factor

During the summer seasons in the region discussed there is the maximum development of monsoons. The strong southwest monsoon of India blows during the hot months and is accompanied by dense clouds, thunderstorms, and much rain. These winds are not favorable for aviation either in direction or in their accompanying meteorology; but here again they are confined to the lower 12,000 feet, and above this (as the Dutch have shown in Java) are found trade winds. The winter monsoon is practically the same as the trade wind.

In Australia the northwest monsoon blows in the northern region during the three hottest months. It is a layer of turbulent wind, and probably the aviator will prefer to fly above it, though the dominan monsoon wind from the northwest would help him to the south. Its exten and character can at present only be surmised.

Where the sun is vertically overhead the air is rising, and these regions though calm at the surface, are certainly turbulent areas in the flight zone



From Central Weather Bureau, Melbourne Jan 1919

THE GEOGR. REVIEW, APR. 1919

FIG. 2—Sketch map of Australasia showing the dominant winds in January. Equatorial scale, 1:100,000,000. The winds of the upper flying layers are shown on stilts. HUR=hurricane.

However, though heat bumps on a large scale may be apparent, they have not much significance for a modern plane and can be avoided by high flying.

OTHER METEOROLOGICAL CONDITIONS

The most violent storms of the tropics are the occasional hurricanes. Luckily these are confined to the oceans and rarely cause much damage far inland. They are prevalent in summer in the regions indicated, but airplanes flying overland will not often be dangerously affected. This is an unknown field of research, but one which it will be disastrous to neglect much longer.

The southern portion of Australia is dominated by anticyclones at the surface and by the westerly drift above. Here we are on more familiar ound. The anticyclones are surrounded by variable winds, generally nimportant from the present point of view. They have clear skies and ford good flying weather. The aviator will be interested in the more tense lows (or cyclones) which periodically travel across southern ustralia, but they are regularly forecast and should not catch him nprepared for their clouds, rain, and strong winds.

The writer began this article with a quotation and will conclude with

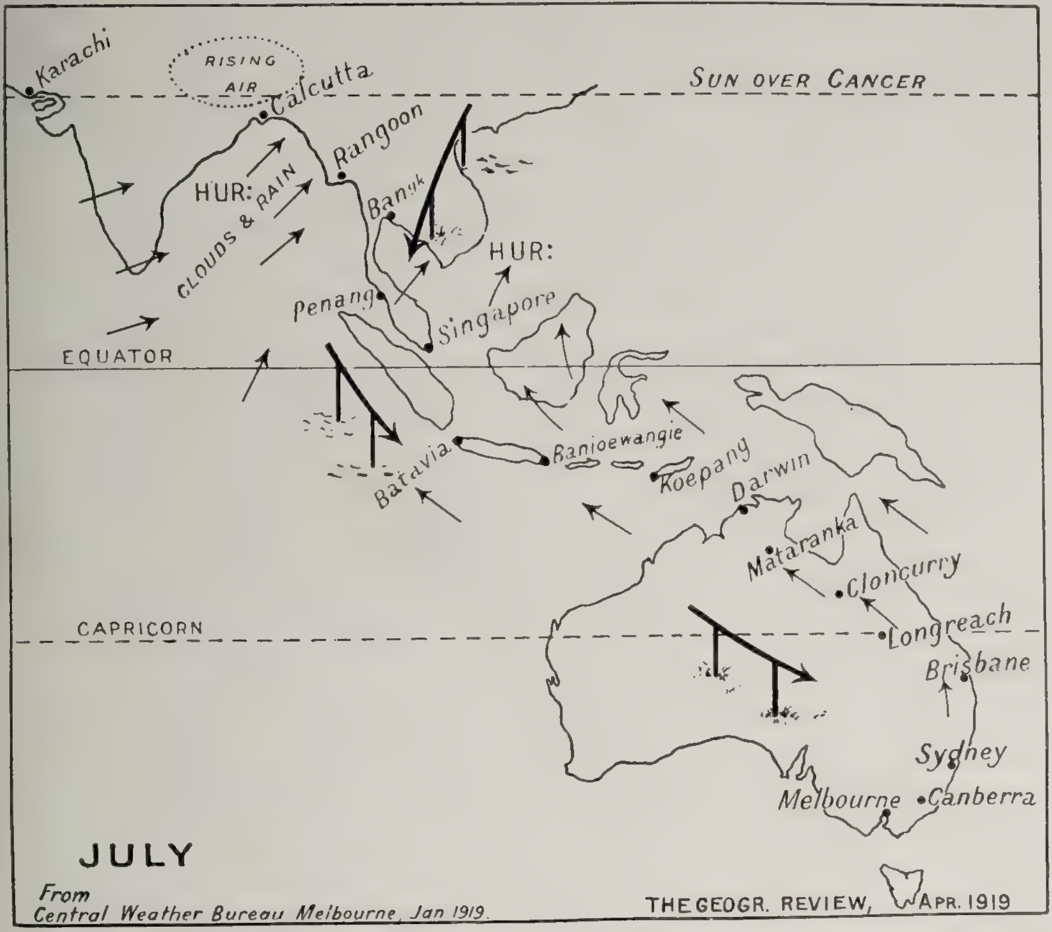


FIG. 3—Sketch map of Australasia showing the dominant winds in July. Equatorial scale, 1:100,000,000. The winds of the upper flying layers are shown on stilts. HUR=hurricane.

ne. Lieutenant Colonel Mervyn O'Gorman in a note added to the Fifth Vilbur Wright Memorial Lecture stated:[3]

> Commercial aëronautics are bound up with using the [special] values which accrue ncidentally to the employment of aircraft. I take three of these: (1) the speed of ransit made available, (2) the directness of the route which can be selected, (3) the tilization of helpful winds and evading bad weather.

Much more might be written on this topic, but it is hoped that the eader will now realize how intimate is the connection between meteorology nd aviation and also how much remains to be done in a scientific preparaion for the forthcoming aërial traffic.

---

[3] Mervyn O'Gorman: Looking Ahead (Being the Fifth Wilbur Wright Memorial Lecture, Delivered efore the Aeronautical Society at Grafton Galleries, London, on June 13, 1917), *Flight*, No. 442, Vol. 9, 917, pp. 599-603 and 629, London.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Award of the Cullum Geographical Medal to Emmanuel de Margerie. T Cullum Geographical Medal of the American Geographical Society for 1919 has bee awarded to Emmanuel de Margerie, the eminent French authority on geographic geology, as the field has been termed that he has made peculiarly his own. M. de Ma gerie is a voluminous writer, a bibliography of his works to 1917 enumerating over 3 items. He is possibly best known for his masterly annotated French translation Suess's ‘‘Das Antlitz der Erde.’’ M. de Margerie has made a special study of t physical geography of the United States, on which subject he may without exaggerati be said to be more widely read than any other person, irrespective of nationality. 1912 he was a member of the Society's Transcontinental Excursion across the Unit States.

The presentation will be made at Paris by the American Ambassador. An announ ment will be made in a later issue of the *Review.*

Meetings of March. An inter-monthly meeting of the American Geographi Society was held on Tuesday evening, March 11, at the Engineering Societies' Buildin 29 West Thirty-ninth Street. President Greenough presided. The lecturer of t evening was Mr. Herman Montagu Donner, the Anglo-Finnish poet and a recogniz authority on Finland. The address dealt with the geography and history of Finla and the recent struggles of the Finnish people.

A monthly meeting of the Society was held on March 25. President Greenou presided. He submitted the names of 17 candidates for Fellowship, each of whom h been approved by the Council, and they were confirmed as Fellows of the Socie Thereupon Professor J. Paul Goode of the Department of Geography of the Universi of Chicago addressed the Society on ‘‘America as a World Power.’’ As on the occasi of his previous lecture before the Society at the beginning of the war (*Geogr. R* Vol. 1, 1916, p. 371) maps and diagrams in the form of lantern slides were used great advantage to make clear the multitude of geographic, ethnic, and economic fact involved.

NORTH AMERICA

Progress in Signposting the Western Deserts. The novel work of erecting si posts in our Western deserts that will direct the traveler to watering places was m tioned in the *Geographical Review* (Vol. 4, 1917, p. 395). This movement was then o in its initial stages. Since that time the U. S. Geological Survey has continued ope tions, having now completed a survey of about 60,000 square miles in the Sonoran Des province of southern California and southwestern Arizona (*U. S. Geol. Survey 3 Annual Rept.*, Washington, 1918, pp. 118-119). This province extends northwest-sou east between the Arizona Highlands and the Los Angeles ranges; on the north it limited by the Great Basin; on the south it continues along the eastern coastal pl of the Gulf of California into the state of Sonora, Mexico. The southern end of De Valley, at the northern end of the province, was also investigated.

‘‘This region was selected because it is the driest, hottest, and least explored part the desert region, and also because of the strategic importance of obtaining informat on the water supplies along the 350 miles of national frontier that it includes. The fi work was done by four parties, each of which consisted of one geologist and one n technical assistant outfitted with an automobile and light camping equipment. Pr tically all watering places in the region were examined, about 160 samples of wa were collected and shipped to the water-resources laboratory at Washington, D. C., analysis, and a general exploration was made of the geography, geology, and grou water conditions of the region. The maps prepared and the data obtained were ma available to the Army engineers for incorporation in the progressive military map the United States. Guides with maps are being prepared for publication.

‘‘Signs directing travelers to water were erected at 167 localities in California a 138 in Arizona. . . . . They are of two sizes. . . . . Most of the larger signs, of wh 470 were erected, give the names, distances, and directions to four watering plac most of the smaller signs, 165 of which were erected, give the names, distances, a directions to two watering places. The work done last year is a part of a comprehens lan for mapping and marking the watering places in the entire arid region lying east of he Sierra Navada and Cascade Mountains and west of a line running approximately from astern Oregon through Salt Lake City and Santa Fe to the mouth of Pecos River.'' On the Western deserts in general see D. T. MacDougal: North American Deserts, *eogr. Journ.*, Vol. 39, 1912, pp. 105-123, with map by Forrest Shreve, 1:15,000,000; n Death Valley cf.: M. W. Harrington: Notes on the Climate and Meteorology of eath Valley, California, *U. S. Weather Bureau Bull. No. 1*, 1892, and Ellsworth Huntngton: Death Valley and Our Future Climate, *Harper's Magazine*, May, 1916, pp. 919-28. An excellent account of the physical geography, vegetation, and biogeography of he Sonoran Desert province is to be found in E. A. Mearns: Mammals of the Mexican oundary of the United States, *Bull. U. S. Natl. Museum No. 66*, Part I, 1907.)

The Major Controls of the Climates of the United States. The most important ontrols of the climates of the United States, as given in a recent discussion of this ubject by Professor Robert DeC. Ward (*Monthly Weather Rev.*, Vol. 46, 1918, pp. 64-468), are (1) latitude, (2) land and water, (3) mountain barriers, (4) altitude, 5) prevailing winds, (6) ocean currents, and (7) storms. Latitude obviously stands irst. Upon it depend the prevailing annual and seasonal differences in temperature etween the northern and the southern portions of the country. Yet many other factors ave to be taken into account, e.g. winds, which, importing heat or cold from a distance, ipe out climatic boundaries and often to a marked degree—sometimes even completely —nullify the effects of latitude. The influence of latitude may also be wholly overcome y the effects of land and water. North America as a whole is cooler in winter and armer in summer than the adjacent oceans in similar latitudes. The marked and sysematic deflections of the January and the July isotherms clearly show this. Neither the acific nor the Atlantic Ocean can attain its maximum control over the climates of the ontinent—the former, because of the presence of the mountain barrier near the west oast; the latter, because it is on the lee side of the continent. The Gulf of Mexico has marked influence over the rainfall and the temperatures of the eastern United States. o the south, southeast, and southwest winds which prevail over the eastern sections in ummer, much, if not most, of the warm-season rainfall is due. Furthermore, throughut the year and especially in winter, temporary warm and damp winds, associated with passing storm conditions, blow with considerable frequency from southerly directions and arry the warming influence of the Gulf far northward. The Great Lakes are of relatively subordinate climatic significance as major controls but show local effects of distinct economic importance. Among these effects are the later occurrence of the first killing frost in autumn and the earlier date of last killing frost in spring, in favored localities to leeward of the Lakes.

The Sierra Nevada-Cascades are the most important climatic barrier in the country, s they prevent the influence of the Pacific Ocean from being carried far inland. Thus the Pacific Slope climates are sharply defined and are separated from the interior, where the rainfall is less and the ranges of temperature are greater. The Rocky Mountains, together with their subsidiary ranges, are less significant as a climatic barrier than they would be were there no Pacific ranges. The Appalachians are not effective. They are not high. They are near the leeward margin of the continent. They are more or less parallel, during much of the year, to the direction of the prevailing winds. The greatest and most widespread effects of altitude are naturally found in the western plateau and mountain region, where the varied topography gives rise to a great variety of local climates. Prevailing winds have marked climatic effects. In summer, the prevailing wind may be a warm one, as over most of the eastern United States, and the summer heat is therefore increased. Or the prevailing winter wind may be a cold one, as in New England, thus making the winters more severe.

A glance at the isothermal charts of the world at once shows the effects of ocean currents in deflecting the isotherms along the coasts of the United States. Off the Pacific coast the isotherms are carried poleward by the warm eddy which sweeps around the Gulf of Alaska and equatorward by the southward-flowing current along the coast of southern California. The result is a spreading of the isotherms and a weak poleward temperature gradient. The Gulf Stream carries the isotherms northward along the southern and central Atlantic coasts, while the Labrador Current carries them southward along the coast of New England and of the Canadian provinces. It is partly for this reason that there is such a very rapid temperature gradient northward along this coast, amounting to 2.7° F. per latitude degree in January.

Cyclones and anticyclones are essential controls of climate in the latitudes of the ''prevailing westerly'' winds. Climate is average weather, and the different weather types give climates their distinctive characters and to a large extent determine the amount and distribution of temperature, of rain and snow, of humidity, of cloudiness.

This latter subject has been more fully discussed by Professor Ward in a paper entitled "The Weather Element in American Climates" (*Annals Assoc. Amer. Geogrs.*, Vol. 4, 1915, pp. 3-54).

Smoke from the Minnesota Forest Fires of October, 1918. Between October 13 and 17, 1918, smoke clouds from forest fires in Minnesota and the adjacent sections of Wisconsin spread over a large portion of the United States east of the Missouri River. As stated in Mr. Richardson's article above, the fires started on October 12, following an exceptionally severe drought during which the precipitation had averaged only 20 to 25 per cent of the normal. At Duluth the smoke became dense about the middle of the afternoon. By the morning of the 13th the smoke-cloud had overspread the Michigan Peninsula and central Indiana. In twelve hours more, strong northwest winds had carried this cloud across Ohio into New York, Pennsylvania, West Virginia, Maryland, and the District of Columbia. The two latter sections were reached shortly after 10 P. M. On the morning of the 14th, the smoke had spread as far south as Charleston, S. C., and Little Rock, Ark., and in another day more than 300 miles farther. On the 15th easterly winds set in in western Minnesota. The smoke cloud was carried across North Dakota on the 16th and into Nebraska on the following day. The transportation of smoke clouds eastward from forest fires in the Northwest has often been observed in the United States, especially during dry spells in the late summer and autumn months. The peculiar feature of the phenomenon in October, 1918, was the extraordinary rapidity of the eastward and southeastward progression of the smoke. The meteorological conditions which prevailed during this particular period are considered and many details regarding the occurrence are given in a recent discussion by Mr. Herbert Lyman (*Monthly Weather Rev.*, Vol. 46, 1918, pp. 506-509). R. DeC. Ward

A Memorial to Major Powell at the Grand Canyon. On May 20, 1918, upon the border of the Grand Canyon of the Colorado there was dedicated a simple monument to the memory of John Wesley Powell, first explorer of that gorge. It consists of a truncated pyramid built of rough-hewn native stone and standing on the rim of the canyon at Sentinel Point, about a mile west of Grand Canyon station. A bronze tablet bears a low-relief portrait of Powell and the names of the other men who took part in his two expeditions down the dangerous course of the river. Mr. Frederick S. Dellenbaugh, late librarian of the American Geographical Society and one of the survivors of those explorations, writing in the *American Anthropologist* for October-December, 1918 (pp. 432-436), fittingly speaks of the monument as "marking the conclusion of a great epoch in the history of the United States, the epoch of western exploration and exploratory development." The story of Powell's voyage down the canyon in 1869, his more complete survey of 1871, and subsequent work conducted under his guidance is told in his own report to the Smithsonian Institution entitled "Exploration of the Colorado River of the West and Its Tributaries" (Washington, 1875). This volume has long been out of print, but a later edition, "First Through the Grand Canyon," edited by Horace Kephart, was published in 1915. F. S. Dellenbaugh in the "Romance of the Colorado River" (New York, 1902) and "A Canyon Voyage" (New York, 1908) gives the history of Powell's two expeditions, including also an account of other attempts to navigate the gorge and a full description of the canyon.

Though the descent of the Colorado was the most picturesque of Powell's achievements, it was by no means the most important. Largely through his efforts was brought about the co-ordination of the various federal surveys which up to 1879 had been engaged in the exploration of the national domain and which were merged in that year to form the United States Geological Survey. In this connection it is interesting to note that, according to Gilbert, Powell's plan for the organization of the Geological Survey, which was not adopted in full, included the formation of three bureaus to conduct investigations in the fields of geology, geography, and ethnology. His activities as director of that survey from 1881 until 1894 and of the Bureau of Ethnology from 1879 to 1902, the year of his death, constitute a notable contribution to science. A biographical sketch by G. K. Gilbert is contained in the *Annual Report of the Smithsonian Institution for 1902* (pp. 633-640) and one by W. M. Davis is given in the Biographical Memoirs of the National Academy of Sciences (Washington, 1915).

SOUTH AMERICA

Rainfall of Chile. In the general distribution of its rainfall, Chile presents many striking analogies with the Pacific coast of the United States. From the heavy rainfall of the southern Chilean provinces to the aridity of the northern nitrate provinces there is the same general gradation as is seen in passing from the rainy northwestern coast of Washington to the dry districts of Southern California and of Lower California. There have recently been published monthly rainfall values for Chile for the period 1910-15, together with a complete summary of the available annual values from 1849 to 1915 (*Inst. Meteorol. y Geofís. de Chile Publ. No. 20,* Santiago, 1917). Mr. R. C. Mossman has reviewed these new data (*Quart. Journ. Royal Meteorol. Soc.,* Oct. 1918, pp. 294-302), thereby extending a previous paper of his on the climate of Chile (*Journ. Scottish Meteorol. Soc.,* Vol. 15, 1911, pp. 313-346) in which he discussed the pressure, wind, and other conditions which control the annual and seasonal rainfall of that country.

The rainfall of Chile in middle latitudes is very variable, years of *mean* annual precipitation being comparatively rare, while there is a pronounced tendency to years of drought and of excessive rainfall. In the rainy season, which is from May to August in latitudes 27°-40° S. (and probably as far as 44° S.), 95 per cent of the annual fall occurs at Serena (30° S.), the proportion diminishing steadily as one goes south. A five-year record for Cabo Roper (46°49′ S.) shows an equable distribution through the year. The annual number of rainy days increases from 5 at Caldera (27° S.) to 315 at Evangelists' Island (52°24′ S.). There is much interest in the region of maximum rainfall in Chile, which ought also to prove to be the wettest in the whole continent of South America. Data are still incomplete, but more than 200 inches of rain in one year have been recorded at three points between latitudes 42°30′ and 52°30′ S.

R. DeC. Ward

EUROPE

The Geography of the Waldensian Valleys in the Italian Alps. In the article on "The Regions of Mixed Populations in Northern Italy" by Professor Marinelli in the March number of the *Review* mention was made (p. 147) of the Waldensians, the French-speaking, Protestant sect in the Italian Alps inhabiting the upper basin of the Pellice, a tributary of the Po, and the contiguous valley of the Germanasca. It is the inaccessibility of their valleys from the lower plains on either side of the Cottian Alps that has kept the Waldensians isolated ethnically, linguistically, economically, and in religion from the surrounding communities. An excellent geographical study of this group has recently been published by a native of the district (G. B. Roletto: Ricerche antropogeografiche sulla Val Pellice, *Memorie Geogr.* (Suppl. alla *Riv. Geogr. Ital.*) *No. 35,* Florence, 1918).

Springing from glacial lakelets on the slopes of Monte Granero the Pellice first flows north and then in a generally easterly direction, receiving tributaries from the valleys on either side, for a distance of 42 miles, in which it drops 7,860 feet till it empties into the Po. The rapid descent differentiates sharply the character of the three successive divisions of the valley, marked by the towns of Bobbio, Villar, and Torre respectively: the upper valley, which is wholly pastoral; the middle valley, where agriculture and pastoral pursuits exist side by side; the lower valley, where agriculture and industrial pursuits are combined. The last stretch of the Pellice, being outside the valley, is not considered. The triple division is emphasized in every geographical aspect of the problem. It applies also to religious conditions, the upper valley being almost wholly Waldensian in the schools and public institutions as well as the churches, while in the middle valley Waldensians and Catholics are nearly equal and in the lower valley the Catholics prevail.

As in other high Alpine valleys, *transhumance,* or seasonal migration from one level to another, is the controlling factor in the economy of the upper valley—to select only one element of this comprehensive study for discussion (see the note on "Illustrations of Seasonal Migration from Switzerland and the Dinaric Countries," *Geogr. Rev.,* Vol. 6, 1918, pp. 73-74). Because of its two phases, involving a division of labor between the men and the other members of the family, the author terms this type of migration agricultural-pastoral nomadism (illustrated by a diagram, Fig. 6, p. 53). Late in April each family leaves its permanent dwelling in the valley bottom or on the lower slopes and goes up to the level of the *fourèsts,* the temporary summer huts. Here the women and children stay to tend the herd and to start the garden. The men and some of the women return to the valley bottom during the first half of May to cut the first crop of hay. At the end of the month the men descend to the plain (the Plain of the Po) to get the cattle from the winter pasture. The ascent of the whole family to the highest level of summer activity, the alp, takes place in the second half of June. As soon as the herd is properly established there the men return to the *fourèst* level to cut their second crop of hay. The descent of the herds from the alp to the *fourèst* takes place in the second half of August. The men have already begun to reap the grain, in which they are now assisted by the whole family. The potatoes are dug up and the ground prepared for oats and rye. At the first autumnal rains the whole family descends to the permanent dwelling. The third crop of hay is cut soon after. At the beginning o November the herds are taken down to the plain.

In this connection it is of interest to note that the *fourèsts,* although now temporar habitations only, were once permanently occupied. In the seventeenth century flood and, particularly, the pestilence of 1630 drove the inhabitants to occupy the highe levels. The high mortality of this period was not overcome until the end of the century when a population increase led to the re-occupation of the valley bottoms.

Early Maps of Scotland. The Royal Scottish Geographical Society has recentl undertaken to augment its collection of old maps of Scotland. Starting with a nucleu of 28 maps dating earlier than 1836, all but five of them prior to 1800, the committe organized for the purpose has been able to obtain, either by gift or purchase, some ver interesting maps and plans. A description by Mr. Harry R. G. Inglis of those alread in the Society's collection is contained in the *Scottish Geographical Magazine* for June 1918 (pp. 217-230). Succeeding numbers of the magazine (Oct., 1918, pp. 378-386, an Feb., 1919, pp. 41-46) give some account of those maps which, either because of thei value as bases for later work or because of unique features, are of peculiar interest.

Among rare maps of Scotland already secured in this campaign is one by an unknown Italian cartographer apparently issued between 1560 and 1570 and evidentl based on a still earlier unidentified map (*ibid.,* Dec., 1918, p. 466; reproduced in Feb. 1919, number). Another that has attracted attention is one of Scotland by the Frenc cartographer Barbie du Bocage, whose best known works are the maps of Greece i Barthelemy's "Voyage du Jeune Anacharsis en Grèce" (Paris, 1799). The Scottis Society has thus far been unable to discover any mention of a map of Scotland in list of those made by this geographer.

It may be of interest to members of the American Geographical Society to kno that in the map collection of this Society are found 14 out of the 23 early maps of Scotland in the original collection of the Scottish Geographical Society. Of the eight o earliest date all but one (that of Nagel, of which no other copy is known) are in th American Geographical Society's collection. In addition the Society possesses the following maps of Scotland dating earlier than 1700: Ortelius, 1579 and 1584 editions o atlas; Mercator, 1613 and 1633 editions of atlas; Speed, 1676; Coronelli, c. 1692.

AFRICA

Cape-to-Cairo Air Routes. In connection with Dr. Taylor's article on "Ai Routes to Australia" in this number of the *Review* and the recent airplane flights i four days from England to India, to which he also refers, the plans for an air rout from Cairo to Cape Town are of interest. They were outlined in an address to th African Society of London on January 7, 1919, on "Commercial Aviation in the Lig of War Experience" by Major-General Sir F. H. Sykes, Chief of the British Air Sta (*The African World,* Jan. 11, 1919, p. 341, London; see also Jan. 18 issue, p. 382).

The flights will be undertaken both by flying boat and by airplane. In each case th route follows the Nile to Lake Tanganyika. It is hoped to provide landing places ever 200 miles in this stretch, at Assuan, Wadi Halfa, Abu Hamed, Khartum, Kodo (Fashoda), Lake No, Bor (6° N.), Lake Albert, Jinja (at Nile outlet of Lake Victoria Ujiji on Lake Tanganyika. The route for the flying boat will then be Karonga (at th head of Lake Nyassa), Blantyre, Beira, Lourenço Marques, Durban, Port Elizabet Cape Town, 5,700 miles in all; and for the airplane: Elizabethville, Livingstone, Buluwayo, Johannesburg, Bloemfontein, Cape Town, 5,300 miles. Survey parties have already been sent out from Cairo to inspect and arrange possible landing places.

The Cape-to-Cairo route will form part of a through air service from London t Cape Town. A preliminary flight, estimated to take 7-14 days, will soon be made by Handley-Page machine under the auspices of the British Air Ministry. The callin places on the way to Cairo will be Marseilles, Naples, and Crete. Ultimately it is expected that the distance of 7,000 miles between London and Cape Town will be covere in six days (this is about the same average speed as that assumed by Dr. Taylor between Calcutta and Brisbane).

GEOGRAPHICAL NEWS

Officers of the Association of American Geographers for 1919. The followin were elected officers of the Association of American Geographers at the fourteent annual meeting at Baltimore, December 27-28, 1918: President, Professor Charles R Dryer; First Vice-President, Dr. Herbert E. Gregory; Second Vice-President, Dr Isaiah Bowman; Secretary, Dr. Oliver L. Fassig; Treasurer, Mr. François E. Matthes Councilor for three years, Professor Eliot Blackwelder.

Creation of a Mexican Bureau of Archeology and Ethnography. The Govern- nt of Mexico, through its Department of Agriculture and Development (Fomento), s organized a bureau of archeological and ethnographical studies (Secretaría de Agri- ltura y Fomento: Programa de la Dirección de Estudios Arqueológicos y Etnográficos, rmulado por el Director Manuel Gamio, 44 pp., Mexico, 1918). The purpose of this reau will be to carry on scientific investigations regarding the aboriginal races of the public, their geographical environment, their culture, languages, monuments, history, d their present social and economic condition as related to their importance in the velopment of national unity. The work will be undertaken on the basis of regional rveys covering the above points. As nearly 40 per cent of the inhabitants of Mexico e of pure Indian stock and about an equal proportion are of mixed race, the Indian ment predominating, such a study as that contemplated should yield important results th to the sciences concerned and in the welfare of the republic.

PERSONAL

Dr. William T. Brigham, in charge of the Bernice Pauahi Bishop Museum of onolulu since its foundation, has resigned the directorship of the institution, and the ustees have conferred upon him the title of Director Emeritus. Dr. Brigham continues s connection with the museum as Curator of Anthropology.

The Hon. H. Burton, South African Minister of Railways and Harbours, delivered lecture on ‘‘Railways and Communications in South Africa’’ before the African ciety of London at its first luncheon meeting in 1918.

Mr. William Crooke, late of the Bengal Civil Service, has received the honorary gree of D.Sc. from the University of Oxford in recognition of his researches on the thropology of the native races of India. Among other works he has written: ‘‘The rthwestern Provinces of India: Their History, Ethnology, and Administration,’’ Lon- n, 1897, and ‘‘Natives of Northern India’’ (in series ‘‘The Native Races of the itish Empire’’), London, 1907.

Dr. J. J. Galloway of the Department of Geology of Columbia University spent the mmer of 1918 in the peninsula of Yucatan studying its geology and petroleum re- urces.

Dr. Aleš Hrdlička of the United States National Museum read a paper on ‘‘The ar and the Race’’ before Section H of the American Association for the Advancement Science at its seventy-first meeting at Baltimore, December 23-28, 1918.

Sir Harry Johnston, the noted authority on colonial Africa, who was elected presi- nt of the African Society of London for 1919, delivered an address before that body titled ‘‘The Importance of Africa’’ at the first of a series of luncheon meetings held that Society in 1918.

Mr. E M. Lehnerts, director and editor of the *Bulletin of the American Bureau of ography,* 1900-1901, and joint editor of the *Journal of Geography,* 1902-1904, read a per on March 17 before the New York Academy of Sciences entitled ‘‘Some Field udies in Glacier [National] Park.’’

Mr. Philip Ainsworth Means sailed on March 15 from New Orleans for Peru and uador, where he will undertake general historical and archeological studies. Mr. eans contributed an article entitled ‘‘A Note on the Guaraní Invasions of the Inca mpire’’ to the December, 1917, *Review*, and is the author of ‘‘An Outline of the lture Sequence in the Andean Area’’ (reviewed in the *Geogr. Rev.*, Vol. 4, 1917, p. 0).

Professor J. C. Merriam of the University of California read a paper on ‘‘Race igin and History as Factors in World Politics’’ before Section H of the American ssociation for the Advancement of Science at its seventy-first meeting at Baltimore, ecember 23-28, 1918.

Mr. William P. Northrup, first vice-president of the Matthews-Northrup Works of uffalo, New York, was the guest of honor at a dinner tendered by his associates in ecember, 1918, at the completion of his fiftieth year of connection with the J. N. Mat- ews Company, owners of the Matthews-Northrup Works. The Matthews-Northrup orks are one of the leading commercial map-making firms in this country using the x-engraving process. One of their foremost productions is the Century Atlas.

Dr. H. J. Spinden of the American Museum of Natural History read a paper on ebruary 24 before the American Ethnological Society on ‘‘The Indians of Eastern icaragua.’’

Mr. Vilhjálmur Stefansson was awarded—in addition to the Charles P. Daly Medal of the American Geographical Society (cf. Jan. *Review*, p. 48)—the Hubbard Gold Medal of the National Geographic Society of Washington on January 10, the Elisha Kent Kane Medal of the Geographical Society of Philadelphia on January 24, the Helen Culver Gold Medal of the Geographic Society of Chicago on March 10, and the gold medal of the Explorers' Club of New York, in recognition of his Arctic explorations.

Dr. H. N. Whitford of Yale University read two papers before the meeting of the Society of American Foresters, held in conjunction with the American Association for the Advancement of Science at Baltimore, December 27-28, 1918, entitled "Forest Formations in British Columbia," and "The Structure and Value of the Paraná Pine Forests of Brazil." The latter paper was based on the results of a six months' trip made in the summer of 1918 in behalf of the Yale Forestry School. The Paraná pine (Araucaria) forest is the most extensive coniferous forest in the southern hemisphere and covers a region of not less than 100 square miles.

Obituary

Theodoor de Booy died suddenly from the effects of influenza at Yonkers, N. Y., on February 18, at the age of 36. Although his field of work was archeology, his extensive travels, especially in the West Indies, gave him an intimate knowledge of the geography of those regions. From 1912 to 1918 he was a member of the staff of the Museum of the American Indian, Heye Foundation, of New York City, as field explorer for West Indian work. In 1911 and 1912 he visited the Bahamas, especially the Caicos group; in 1913 and 1914, Jamaica, Santo Domingo, and eastern Cuba; in 1915, the island of Margarita, Venezuela, and Trinidad; in 1916 and 1917, Porto Rico, Martinique, and the Virgin Islands. In 1918 he undertook, under the auspices of the American Geographical Society and the University of Pennsylvania Museum, an expedition to the Sierra de Perija between Colombia and Venezuela to explore the unknown interior of the range and study the Motilone Indians, the savage remnant of a tribe which has always kept their country free from white settlement and exploration. The geographical aspects of this trip were described in the November and December, 1918, issues of the *Geographical Review*, the ethnologic in the *University of Pennsylvania Museum Journal* for September-December, 1918. Among the author's large number of publications the following are of geographical interest: Island of Margarita, Venezuela (*Bull. Pan. Amer. Union*, April 1916); The Birthplace of Josephine, Empress of France [Martinique], *ibid.*, April, 1917; Eastern Part of the Dominican Republic, *ibid.*, Sept., 1917; The Town of Baracoa and the Eastern Part of Cuba, *ibid.*, Nov., 1917; The Virgin Islands of the United States, *Geogr. Rev.*, Nov., 1917; The Turks and Caicos Islands, *ibid.*, July, 1918; The Virgin Islands: Our New Possessions (joint author with J. T. Faris), Philadelphia, 1918; The Less Known Regions of the West Indies, *Journ. of Geogr.*, Feb., 1919; Tropical versus Arctic Exploration, *The Scientific Monthly* (to be published); On the Possibility of Determining the First Landfall of Columbus by Archaeological Research, *Hispanic Amer. Hist. Rev.*, Feb., 1919.

David Lubin of San Francisco, founder of the International Institute of Agriculture in Rome and the American representative on its permanent board, died in Rome on December 31, 1918, in his seventy-seventh year. The International Institute of Agriculture is an organization which collects agricultural information of every sort from all parts of the world. Its regular publications are of great value to geographers because of their international scope. (For an account of the organization see "The International Institute of Agriculture: Its Organization, Activity, and Results," 45 pp., Rome, 1915.)

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

UNITED STATES

General

VAN CLEEF, EUGENE. ***Normal annual precipitation map of the United States.*** Polyconic projection. Base map by J. Paul Goode. 1:3,015,936 [*sic*]. Rand, McNally & Co., New York, 1915.

Meteorological instruction, both in our schools and in our colleges, has been hampered by a lack of suitable wall maps, presenting the essential meteorological and climatological data and published at a reasonable price. In many cases it has been necessary for teachers of meteorology to have enlarged maps made for their own use at a considerable expenditure of time or money or both. Within the last few years, however, a good many of these necessary wall maps have become available at a reasonable price. We now have the excellent series of Oxford Wall Maps, prepared by the late Dr. A. J. Herbertson, and the new set of climatic charts published by Philip and Son of London. We still lack a set of type weather maps suitable for wall use, like Börnstein's excellent series for Europe, published some years ago, and essential in any class-room study of the climatology of Europe. Nevertheless, in spite of this great advance of recent years, there is still need of more such maps, especially of temperature and of rainfall of the various continents, on a larger scale than those above referred to and printed on base maps which give more detail regarding the locations of boundaries, rivers, and important cities. Hence teachers in this country will welcome Mr. Van Cleef's new wall map of the mean annual rainfall of the United States as giving a striking picture of the larger facts of our rainfall distribution.

Many small-scale rainfall maps of the United States have been published during the last few decades. These have differed a good deal from one another, not only because the available rainfall data varied in number and in accuracy but also because the general principle upon which the maps were constructed differed. Some authorities have limited themselves fairly, or absolutely, rigidly to the observed rain-gage readings. Others, on the other hand, using actual observations as far as these went, also took account, in drawing their isohyetal lines, of known facts of topography, stream flow, wind direction, vegetation, and other conditions, inferring the amounts of precipitation over the higher mountain slopes and summits and over unoccupied or thinly settled areas. Thus the maps constructed by what may be called the strictly meteorological group have differed, in general, from those drawn by the second, or geographical, group chiefly in the fact that topographic controls were less completely indicated on the former.

Mr. Van Cleef's map belongs to the second group rather than to the first in that he has clearly brought out many of the more striking topographic controls of rainfall, although many details of such controls are not included. The larger facts on this map stand out very clearly because of the use of eight different colors or shades of color, ranging from bright yellow (under 10 inches) to a darkish blue (over 80 inches). There are advantages, as well as disadvantages, in the use of colors which differ so much from one another as do the blues, greens, and yellows on this map. The obvious advantage is the distinctness with which the different grades of rainfall stand out. The disadvantage is that the contrast between the colors is so marked that the eye gives us an almost unavoidable impression of a sudden change in rainfall amount as one color changes to another on the map. It is essential, in a proper understanding of rainfall distribution, that the idea of a gradual transition from one isohyetal line to the next should always be kept in mind. It is in order to avoid this disadvantage of employing sharply contrasted colors that many rainfall maps are colored altogether in different shades of blue. However, as before stated, the advantage of seeing the facts clearly and at once, is a very considerable one, and there will always be much to be said in favor of the use of striking color contrasts. Mr. Van Cleef has wisely extended his rainfall lines a little distance into Canada and as far south as the Tropic of Cancer. It is a mistake to cut off so many of our climatic charts at the Canadian and the Mexican frontiers. There are no climatic barriers along these frontiers.

The data used in the preparation of the map were taken from *Weather Burea* *Bulletin W* for the United States; from the Canadian Meteorological Service's publica tions for Canada, and from Bartholomew's ''Atlas of Meteorology'' for areas outsid of the United States and Canada. There is no statement regarding the use of a unifor period of observation, nor of any reduction of the data to a uniform period. We mus assume, therefore, that the data used in the construction of the map cover varying num bers of years of observation and are not reduced. It is, of course, most unfortunate tha the map had to be constructed on the basis of raw data which were not treated i accordance with well-recognized climatological principles. An answer to such criticism so far as there is any answer, might be found in the statement that, for ordinary teach ing purposes, the larger facts of our mean annual rainfall distribution are sufficientl accurately indicated on this map as it stands, without the need of the very tiresome an time-consuming labor necessary in order to reduce the data to a homogeneous system.

Since the publication of Mr. Van Cleef's map (1915) the new mean annual precipita tion chart of the ''Atlas of American Agriculture'' has appeared. In this, the record either covered the same period of 20 years (1895-1914) or were reduced to the sam period. This standardization of all the data, the use of a very large number of stations and the inclusion of records extending through 1914, combine to make the new char from the atlas the most accurate one which we have ever had for the United States Mr. Van Cleef's map has not, however, lost its usefulness. It still presents the large facts with sufficient accuracy for most general purposes, and its large scale makes i useful in the classroom, whereas the newer map is on too small a scale to be seen acros a large room.

R. DeC. Ward

Baker, O. E., C. F. Brooks, and R. G. Hainsworth. **A graphic summary o seasonal work on farm crops.** 55 pp.; maps, diagrs. Separate from *Yearbook o* *Dept. of Agric., 1917,* No. 758, Washington, D. C., 1918. [A series of maps shows th time distribution of the chief seasonal operations in the cultivation of the staple crop of the United States. ''The most striking feature of the maps is the northward an upward movement of spring operations and events and the southward and downwar progress in autumn. This movement progresses at a rate of approximately 1 degree o latitude or 400 feet of altitude in four days. Local climatic influences of the Great Lakes and of the Atlantic Ocean are evident on almost every map. In operations whic may be performed during a long period the maps indicate for the most part only th effect of local competition for labor by other crops, although the underlying control o general climatic conditions is not wholly obscured. Local markets may hasten the harves of certain crops, such as potatoes, near the large cities.'' Seasonal distribution o labor is also shown graphically for typical agricultural areas.]

Bowles, Oliver. **Rock quarrying for cement manufacture.** xiii and 160 pp. diagrs., ills., index. *Bur. of Mines Bull. 160,* Dept. of the Interior, Washington, D. C., 1918 [Includes a brief historical statement concerning the phenomenal growth of the Portland cement industry in the United States. According to preliminary estimates of the U. S Geological Survey the output of this material in 1917 had reached a total of 93,500,000 barrels.]

Dale, H. C., edit. **The Ashley-Smith explorations and the discovery of a central route to the Pacific, 1822-1829; with the original journals.** 352 pp.; maps, ills., bibliogr., index. Arthur H. Clark Co., Cleveland, 1918. $5.00. 9½ x 6. [''Ashley and his men plotted the course as far as Green River and the Great Salt Lake by way of the North Platte and the South Platte; Smith, Ashley's successor in business, continued the latter's explorations, reaching California by way of the Colorado River and the Mohave Desert, returning from central California, eastward, across the present state of Nevada, to the Great Salt Lake again. A second expedition carried Smith, the first white man, the entire length of California and Oregon to the Columbia'' (p. 14). The account of these explorations is preceded by a chapter on the fur trade and the progress of discovery to 1822. The ''physiographic map'' accompanying the text is a route map on which drainage basins are also defined.]

Gregg, W. R. **Mean values of free-air barometric and vapor pressures, temperatures, and densities over the United States.** *Monthly Weather Rev.,* Vol. 46, 1918, No. 1, pp. 11-20. Washington, D. C. [Average values as determined from all available observations thus far made by the U. S. Weather Bureau in this country.]

Gulick, S. L. **American democracy and Asiatic citizenship.** xii and 257 pp. Charles Scribner's Sons, New York, 1918. $1.75. 8 x 5½.

Henry, A. J. **Hot spell of August, 1918.** *Monthly Weather Rev.,* Vol. 46, 1918, No. 8, pp. 361-363. Washington, D. C.

Horwill, H. W. **A negro exodus.** *Contemporary Rev.*, No. 633, Vol. 114, 1918, ept., pp. 299-305. London. [Unsatisfactory economic and social conditions in the outh made the negro discontented. Extensive floods and the depredations of the boll eevil suddenly accentuated the difficulties of living just at the moment that immigra- on ceased and labor shortage in the North was increased by our entrance into the war. he negro responded to these conditions by migrating northward. No census has been ken, but the number is variously estimated at from 250,000 to 500,000.]

Keir, Malcolm. **The localization of industry.** *Scientific Monthly,* Vol. 8, 1919, o. 1, pp. 32-48.

Lesher, C. E. **Coal in 1916.** *Mineral Resources of the United States, 1916,* Part I, pp. 901-991. U. S. Geol. Survey, Washington, D. C., 1918.

Norton, W. H. **Earth science in American colleges and universities.** *School nd Society,* No. 207, Vol. 8, 1918, December 14, pp. 702-706.

Pelzer, Louis. **Marches of the dragoons in the Mississippi Valley.** x and 282 p.; index. State Historical Society of Iowa, Iowa City, 1917. $2.50. 9 x 6. [Work f the frontier army, one of the factors in the westward spread, 1833-1861.]

Pratt, E. E. **The export lumber trade of the United States.** 117 pp.; maps, lls. *Bur. of Foreign and Domestic Commerce Misc. Ser. No. 67.* Dept. of Commerce, Vashington, D. C., 1918.

Smith, G. O. **The economic limits to domestic independence in minerals.** *ineral Resources of the United States, 1917,* Part I, pp. 1a-6a. U. S. Geol. Survey, Vashington, D. C., 1918.

Sullivan, L. R. **Racial types in the population of the United States.** Maps. *mer. Museum Journ.,* Vol. 18, 1918, No. 6, pp. 429-446.

Teele, R. P. **Irrigation in the United States: A discussion of its legal, economic and financial aspects.** xi and 252 pp.; map, diagr., index. D. Appleton & Co., ew York and London, 1915. $1.75. 8 x 5.

—— **United States, Foreign commerce and navigation of the, for the year nding June 30, 1917.** lv and 956 pp.; index. Bur. of Foreign and Domestic Comerce, Dept. of Commerce, Washington, D. C., 1918. $1.50. 12 x 9.

Ward, R. DeC. **Major controls of the climates of the United States.** *Monthly eather Rev.,* Vol. 46, 1918, No. 10, pp. 464-468. [Abstracted on pp. 263-264, above.]

Mulford, J. C., Chief Cartographer; G. E. Lombard, J. M. Darley, E. E. Jenkins, artographers. ***National highways map of the United States showing one hundred fifty housand miles of national highways, proposed by the National Highways Association.*** :3,750,000. Washington, D. C., 1918. [One of the most detailed maps of the United tates as a unit issued by the Association. ''The proposed National Highways shown on his map are substantially all present existing roads. Less than 1,000 miles are projected ighways.'' Towns along the roads are shown in great number. Among the other innuerable highway maps issued by the Association are another map of the United States on he same scale, published in 1915, showing fewer roads and distinguishing the principal ranscontinental highways; maps showing individual highways; and maps showing the ighways in individual states. The legend—when there is any—is on many of the maps bscured by a profusion of publicity text.]

North Atlantic States

aylor, Norman. **Flora of the vicinity of New York.** Map. *Scientific Monthly,* Vol. 4, 1917, No. 6, pp. 548-553.

This paper has geographical aspects of special interest to students of regional eography. The pine barrens of New Jersey are described as occupying the Beacon Hill ormation, which is the oldest region of the coastal plain that can have been continuously overed with vegetation since its origin. About eight per cent of the native vegetation onsists of northern species that reach their local limit within the floral area of New ork, and many more are found within the mountains to the south. Likewise many outhern species reach their extreme northern distribution in the same area. At the present time ''over thirteen per cent of our local plants reach their northern limits within one hundred miles of the City of New York.'' The paper deals not only with the geologic and physiographic controls of vegetation in the past but also with the climatic influence of the present. The most important control seems to be the rather well-defined temperature barrier through which some plants have never been known t go. Among the climatic factors the length of the growing season appears to be th most important. It is pointed out that there is a difference of three months in th growing season between the Catskills and Cape May. The paper is accompanied by map illustrating the length of the growing season within one hundred miles of New York

ABBOTT, C. C. **The archaeological significance of an ancient dune.** *Proc. Amer Philos. Soc.*, Vol. 57, 1918, No. 1, pp. 49-59. Philadelphia. [Delaware River.]

ALLING, H. L. **The Adirondack graphite deposits.** 150 pp.; maps, diagrs., index *New York State Museum Bull. No. 199.* Albany, 1918. 9 x 6.

BISHOP, J. B. **A chronicle of one hundred and fifty years: The Chamber o Commerce of the State of New York, 1768-1918.** xvi and 311 pp.; ills., index Charles Scribner's Sons, New York, 1918. $5.00. 9 x 6.

BONSTEEL, J. A. **Soils of southern New Jersey and their uses.** 78 pp.; maps ills. *U. S. Dept. of Agric. Bull. No. 677* (Contribution from the Bur. of Soils). Washington, D. C., 1918. [This monograph with its nine maps and many well-chosen illustrations differs from the usual soil survey in the greater stress given to the relation between soils and crop selection. In the region studied difference in the character of the soil seems to be the most potent control in that matter. Climatic differences are slight. Distance from market and means of communication vary little. But there is a decided diversity of soil-forming materials, resulting in a number of distinct soil types. Each of these possesses its special type of agricultural occupation. The series of maps shows graphically how closely crop distribution is related to the character of the soil.]

CRESSON, B. F., JR. **Sandy sea coast shore protection.** Maps, diagrs. *Proc. 2nd Pan. Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 6, Section 5: Engineering, pp. 774-784. Washington, D. C., 1917. [The problem in New Jersey.]

EMERSON, B. K. **Geology of Massachusetts and Rhode Island.** 289 pp.; maps, diagr., ills., index. *U. S. Geol. Survey Bull. 597.* Washington, D. C., 1917.

FAIRCHILD, H. L. **Postglacial features of the upper Hudson Valley.** 22 pp.; map, bibliogr., index. *New York State Museum Bull. No. 195.* Albany, 1917.

GAGNON, ALPHONSE. **La question du Vinland.** *Bull. Soc. de Géogr. de Québec*, Vol. 12, 1918, No. 4, pp. 211-216. [Cf. a previous article by the same author listed in the *Review*, Vol. 5, p. 428, with comment.]

GOLDTHWAIT, J. W. **Glaciation in the White Mountains of New Hampshire.** Maps. *Bull. Geol. Soc. of Amer.*, Vol. 27, 1916, No. 2, pp. 263-294.

JOHNSON, D. W. **Date of local glaciation in the White, Adirondack, and Catskill Mountains.** Ills., bibliogr. *Bull. Geol. Soc. of Amer.*, Vol. 28, 1917, No. 3, pp. 543-552. [Questions the validity of certain arguments brought forward in support of the theory of early local glaciation (Goldthwait).]

—— [*Topographic map of the United States.*] Sheets, 1:62,500: (1) ***Belfast,*** (2) ***Cutler,*** (3) ***Machias,*** (4) ***Pasadumkeag, Me.;*** (5) ***Dover, N. H.-Me.;*** (6) ***Hornell,*** (7) ***Moira,*** (8) ***Oneonta,*** (9) ***Russell,*** (10) ***Unadilla, N. Y.*** U. S. Geol. Survey, Washington, D. C., 1917, 1918.

EUROPE

FRANCE

MUSSET, RENÉ. **Le Bas-Maine: Étude géographique.** 496 pp.; maps, diagrs., ills., bibliogr. A. Colin, Paris, 1917. 15 fr. 10 x 6½.

A complete and excellent geographical study of a region of France, to be compared with the "Picardie" of Demangeon, the "Flandre" of Blanchard, and other monographs of the French school of regional geography.

The Bas-Maine is the western part of the old province of Maine, extending over the eastern border of the Armorican massif, while the Haut-Maine extends over the Cretaceous plateaus of the southwestern part of the Paris Basin. It is particularly interesting as a typical *pays de bocage*. *Bocage* is the name for one of the geographical features of western France, wherein human occupation has effected a certain characteristic change in the landscape; it emphasizes the wooded appearance of a slightly undulating country, thoroughly cleared of forests and cultivated, with scattered farms and lines of trees enclosing every field. Other aspects are the *plaine*, not a region of plains, ut a country in which the fields are not enclosed and cattle are allowed to pasture verywhere after the harvest, the farms being ordinarily grouped in villages; the *val,* a road alluvial flat, with various crops, cereals and hay, orchards and even vineyards; and he *lande.* The *lande* is a surface that is neither enclosed nor ordinarily cultivated and onsequently is used as pasture ground: it can sometimes be cultivated for a year or wo after burning the vegetation composed chiefly of heath, *Ulex,* and some grass. The Bas-Maine was formerly a country of woods, *landes,* and *bocage;* not till the last entury did agriculture extend over the whole area. The study of this transformation s one of the most attractive parts of the work of Musset.

The study of the physiography leads also to some very interesting conclusions. The Bas-Maine is a region of Paleozoic, strongly folded strata, with granitic intrusions, the eneplanation of which was certainly completed in early Mesozoic times. Three platorms or peneplane surfaces can be distinguished: the "plateforme de Multone," the ighest and the oldest, is only represented by flat-topped buttes and crests of hard rock; he "plateforme de la Foret de Mayenne" is more developed to the northeast, forming olling plateaus between 200 and 330 meters in elevation, partly covered with *landes* nd forests; the "plateforme de Jublains," extending over most of the region, is a typical young dissected peneplane, which can be traced even over the Cretaceous plateaus of the Haut-Maine. The author believes it was formed in the early Tertiary, because it is covered by Eocene continental deposits. It has been buried for a long time and has been recently cleared of Tertiary deposits by rejuvenated erosion. Warping in the Miocene may account for the high altitude of the platforms to the northeast and for the course of the main rivers, descending from the elevated area without any relation to the tectonic lines of the folded Paleozoic strata.

Students in human geography will be deeply interested in the second part of the book. It follows the same line as Sion's excellent work, "Les paysans de la Normandie orientale," giving pictures of the successive stages of economic life, based upon accurate historic investigations. He traces the growth of colonization and deforestation from the tenth to the thirteenth century and the development of rural life; the extension of home industry based upon the cultivation of flax and the world-wide commerce in linen cloth in the seventeenth and eighteenth centuries; the decline of this industry and the bad conditions of the country at the beginning of the nineteenth century, when more than half of the surface was nothing but pasture (*landes*); the economic revolution due to the use of chemical fertilizers (chiefly lime derived from the Paleozoic limestones) and to the improvement of roads and rivers and the building of railroads. Now the country is in excellent condition, with only 2.5 per cent of *landes;* a large stock of cattle, swine, and horses; and good crops of wheat, barley, oats, and hay.

EMMANUEL DE MARTONNE

ALLIX, A. **Vizille et le bassin inférieur de la Romanche.** Maps, diagrs., ills., bibliogr. *Recueil des Trav. de l'Inst. de Géogr. Alpine,* Vol. 5, 1917, No. 2, pp. 129-327. Grenoble. [A highly detailed and suggestive regional study of a small area in the French Alps.]

BÉNÉVENT, M. E. **La neige dans des Alpes Françaises.** Diagrs. *Recueil des Trav. de l'Inst. de Géogr. Alpine,* Vol. 5, 1917, No. 4, pp. 403-497. Grenoble. [The regimen of the snowfall is discussed in respect of quantity, frequence of precipitation, and duration of snow cover. In conclusion these factors are analyzed in their combined effect on human relation. The region naturally falls into two main subdivisions—the Northern Alps, whose precipitation is controlled by oceanic influence, and the Southern Alps, controlled by Mediterranean influence.]

BLANCHARD, RAOUL. **Bordeaux.** *Rev. de Géogr. Commerciale,* Vol. 43, 1917, No. 7-12, pp. 323-337. Bordeaux.

BLANCHARD, RAOUL. **Comparaison des profils en long des vallées de Tarentaise et Maurienne.** *Recueil des Trav. de l'Inst. de Géogr. Alpine,* Vol. 6, 1918, No. 3, pp. 261-331. Grenoble. [The valleys of the upper Isère and of its tributaries, the Doron and the Arc.]

BLANCHARD, RAOUL. **Trois grandes villes du sud-est.** Maps. *Recueil des Trav. de l'Inst. de Géogr. Alpine,* Vol. 6, 1918, No. 2, pp. 153-210. Grenoble. [This study of the towns of Lyons, Marseilles, and Nice is developed on the lines of the author's previous studies (Deux grandes villes françaises, Lille et Nancy, *La Géographie,* Vol. 30, 1914-15, pp. 103-122; Bordeaux, *Rev. de Géogr. Commerciale,* Vol. 43, 1917, pp. 323-337; Nantes et Rouen, *ibid.,* 1918). Lyons is a splendid example of geographic factors of *site* and *situation* combining to favor the development of a town (cf. *Review,* Vol. 5, p. 384). In contrast to Lyons, a town at the contact of diverse regions, is Marseilles, a town of the periphery, an entrance and an exit. Nice, like Nancy but unlike Lyons and

Marseilles, is a town of recent growth, on which political events (the annexation of 1870 have had a certain influence. Unlike Nancy, however, which has flourished especiall because of its *situation*, Nice owes everything to its *site*.]

CARTER, HUNTLEY. **The new French regionalism.** *Contemporary Rev.*, No. 631 Vol. 114, 1918, July, pp. 80-86. London. [See the section on France in the note o ''Proposed New Administrative Subdivisions of England, France, and Germany'' in th February, 1919, *Review* (pp. 114-118).]

CHAMBARD, CLÉMENT. **La Montagne Jurassienne: Essai de géographie régionale.** With a preface by E. Fournier. xiv and 150 pp.; maps, diagrs., ills., bibliogr. Imprimerie Moderne, Lons-le-Saunier, 1914. 3 fr. 25. 10 x 6½. [A systematic study according to modern methods of the physical and human geography of the Jura Mountains within the Jura *département*.]

CLERGET, PIERRE. **La délimitation des régions économiques françaises.** *Rev. Gén. des Sci.*, Vol. 30, 1919, No. 4, p. 101. [Refers to the subdivision of France into 16 economic regions discussed in the *Review* note cited in the entry under ''Carter'' above. It is here stated that the Ministry of Commerce subdivision was worked out by Professor Henri Hauser of the University of Lyons ''in conformity with the principles established by Paul Vidal de la Blache.'' The similarity of the Ministry of Commerce project and a subdivision published eight years earlier by Professor Vidal de la Blache was pointed out in the *Review* note and made apparent by there reproducing the two maps side by side. M. Clerget says that the following regions have already been officially organized: Nancy, Bordeaux, Clermont, Limoges, Rouen, Nantes, Toulouse, Montpellier. Certain cities have protested against their allocation to the region to which they were assigned in the project; thus, Nice does not wish to be included in the Marseilles region; Besançon in the Dijon region; Chambéry in the Grenoble region; Saint-Étienne in the Lyons region; Nîmes in the Montpellier region. These protests are simply an expression of marginal tendencies and will doubtless be composed satisfactorily. As the author truly remarks, a region is rooted (''*prend naissance par*'') in its center and not on its periphery.]

DUNOYER, L., AND G. REBOUL. **Sur les variations diurnes du vent en altitude.** *Comptes Rendus de l'Acad. des Sci.* [*de Paris*], Vol. 165, 1917, Dec. 24, pp. 1068-1071.

GORCEIX, CHARLES. **Sur une anomalie des vallées du Borne et du Nom à Saint-Jean-de-Sixt (Haute-Savoie).** Maps, diagrs. *Recueil des Trav. de l'Inst. de Géogr. Alpine*, Vol. 6, 1918, No. 3, pp. 341-369. Grenoble.

GRAVES, H. S. **Effect of the war on forests of France.** Ills. *Amer. Forestry*, No. 300, Vol. 24, 1918, December, pp. 709-717. Washington, D. C.

HARLÉ, ÉDOUARD. **Une tournée de l'ingénieur en chef Le Boullenger dans les dunes de son service entre Capbreton et Cazaux en 1817.** 32 pp.; diagr. Reprinted from *Actes de l'Acad. des Sci., Belles-Lettres et Arts de Bordeaux, 1914.* [Dunes of Gascony. Compare review of another article by the same author in *Geogr. Rev.*, Vol. 2, 1916, p. 394.]

SORRE, MAXIMILIEN. **L'avenir économique des landes.** *Ann. de Géogr.*, No. 147, Vol. 27, 1918, May 15, pp. 188-195. [Discussion of the results of a recent investigation, ''Enquête sur la reprise et le développement de la vie industrielle dans la région landaise,'' 2nd edit., Bordeaux, 1917.]

BARRECCHIA, B. ***Carte des canaux et rivières navigables de la France et de la Belgique, avec distances kilométriques par section et partielles entre toutes les localités desservies par les voies navigables.*** 1:1,200,000. Société Éditrice Géographique, Paris, 1918. [Distinction is made between canals (1) of first and (2) second importance and (3) projected, and between navigable rivers (1) of first and (2) second importance and (3) rivers permitting of rafting. Transfer points between railroads and waterways are also indicated.]

BALKAN STATES, INCLUDING RUMANIA

SAVIĆ, V. R. **The reconstruction of South-Eastern Europe.** With a preface by Sir James George Frazer. ix and 280 pp.; map. Chapman & Hall, Ltd., London, 1917. 7s. 6d. 9 x 6.

TAYLOR, A. H. E. **The future of the Southern Slavs.** 326 pp.; map, index. Dodd, Mead & Co., New York, 1917. $3.00. 8½ x 5½.

Both authors cover ground well trodden by this time. The cause in whose behalf Savić pleads so earnestly has progressed, and the reconstruction which he recommends around a central group formed by a union of peoples of Serbian stock is almost accomplished. Perhaps on that account, and because the viewpoint of a sound Serbian thinker deserves to be known, his book is of greater interest now than ever.

The chapter on commercial possibilities deserves special attention. Savić shows how pronounced was Serbia's isolation before the war. The free development of the country's natural resources was prevented by the Austrian policy of making the little kingdom an economic dependency of the Hapsburg's former empire. With the addition of a seacoast peopled almost exclusively by Serbians, Serbia will acquire trade relations with the world, and the incentive to develop the country's natural resources will be correspondingly increased. Had these features been treated more extensively in the space devoted to the necessarily incomplete war history, the usefulness of the book would have been greater.

Of pertinent interest are the author's words on reconstruction. His plans for the building of railways and canals are not merely of Serbian or Balkan concern but bear on economic problems which belong to European trade and traffic. By its resources as well as by position—both geographical factors—Serbia has a definite line of development marked out by nature which is revealed in its national aims. The failure of Teutonic endeavor in the country is excellent proof that policies tending to oppose natural forces which shape national development are doomed to failure.

Under the title "The Problem of the Adriatic," Savić presents a chapter of Serbian claims to the coast of this sea. Here, in common with many writers, the author appears to ignore the fact that the Adriatic presents considerable analogy with problems of national jurisdiction over river waters forming the boundary between adjoining states. The analogy appears even greater when it is remembered that the Adriatic is an outlet not only for Serbs and Italians but also for Hungarians, Austrians, and Albanians and that Greek interests are also affected.

A much broader treatment of the Adriatic problem will be found in Taylor's work. This author shows that the solution is one which not only affects Italy and Serbia but has deep bearing on European politics. Its settlement in a manner which will satisfy both Serbians and Italians is of prime necessity for the peace of Europe.

An excellent perspective on the Serb's proper place in Europe is provided by Taylor. Not by overturning the past but by maintaining its tradition Serbia will continue to be a main link in the intercourse between Europe and Asia. This continuity of historical function is the unavoidable outcome of geography. LEON DOMINIAN

ALMAGIÀ, ROBERTO. **Il territorio d'occupazione italiana in Albania e l'opera dell'Italia.** *Riv. Coloniale,* Vol. 13, 1918, No. 5, pp. 185-195. Rome.

ANNONI, A. M. **La Jugoslavia economica.** *L'Esplorazione Commerc.,* Vol. 33, 1918, No. 5-6, pp. 81-90; No. 7-8, pp. 105-115; No. 9-11, pp. 146-162. Milan.

AZZI, GEROLAMO. **Quadro fenologico della Bulgaria.** Maps. *Boll. Reale Soc. Geogr. Italiana,* Vol. 7, 1918, No. 5-6, pp. 417-433. Rome.

CVIJIĆ, J[OVAN]. **L'époque glaciaire dans la péninsule Balkanique.** Maps, diagrs. *Ann. de Géogr.,* No. 141, Vol. 26, 1917, pp. 189-218; No. 142, pp. 273-290.

CVIJIĆ, JOVAN. **Unité ethnique et nationale des Yougoslaves.** *Scientia,* No. 74, Vol. 23, 1918, pp. 455-463. Bologna. [Cf. article by the author, "The Geographical Distribution of the Balkan Peoples," *Geogr. Rev.,* Vol. 5, 1918, pp. 345-361.]

DE CRISTO, GIUSEPPE. **Nelle Macedonia greca: Note di geografia etnografica.** *La Geografia,* Vol. 6, 1918, No. 2, pp. 89-94. Novara.

DVORSKY, V. **Alcuni tipi di sedi umane presso gli Slavi meridionali.** *Atti X Congr. Internaz. di Geogr., Roma, 1913,* pp. 1090-1093. Reale Società Geografica, Rome, 1915.

EVANS, ARTHUR. **The Adriatic Slavs and the overland route to Constantinople.** Map. *Geogr. Journ.,* Vol. 47, 1916, No. 4, pp. 241-265 (discussion, pp. 261-265). [See *Geogr. Rev.,* Vol. 2, 1916, pp. 307-308 and 467-468.]

GALLOIS, L. **Les populations slaves de la Péninsule des Balkans.** Map. *Ann. de Géogr.,* No. 150, Vol. 27, 1918, pp. 434-460.

GIUFFRIDA-RUGGERI, V. **I Valacchi dell' Adriatico.** 13 pp. Extract from *Riv. Italiana di Sociologia,* Vol. 20, 1916, No. 5-6. Rome. [The Vlakhs of Dalmatia, Albania, etc.]

MUSONI, FRANCESCO. **Problemi etnografici e politici della penisola balcanica.** *Riv. Geogr. Italiana,* Vol. 25, 1918, No. 1-2, pp. 1-23. Florence. [A good review of Balkan problems but presenting nothing new.]

Newbigin, M. I. **Constantinople and the Straits: The past and the future.** *Scottish Geogr. Mag.*, Vol. 33, 1917, No. 11, pp. 507-515. [Review of "The Question of the Bosphorus and Dardanelles," by Coleman Phillipson and Noel Buxton, London, 1917, and "The Site of Constantinople: A Factor of Historical Value," by Leon Dominian, *Journ. Amer. Oriental Soc.*, Vol. 27, 1917.]

Scriven, G. P. **Recent observations in Albania.** Map, ills. *Natl. Geogr. Mag.*, Vol. 34, 1918, No. 2, pp. 90-114.

Tsanoff, R. A. **Bulgaria's case.** *Journ. of Race Devel.*, Vol. 8, 1918, No. 3, pp. 296-317. Worcester, Mass.

Woods, H. C. **Communications in the Balkans.** Map, ills. *Geogr. Journ.*, Vol. 47, 1916, No. 4, pp. 265-293 (discussion, pp. 290-293).

—— ***Balkan Peninsula, The theatre of war in the.*** 1:1,140,000, or 1 in. to 18 miles. (Stanford's War Maps, No. 16.) Edward Stanford, Ltd., London, March, 1916. [Elevations in five grades of altitude tints in brown.]

—— ***Macédoine-Albanie.*** 1:600,000. A. Taride, Paris, 1917. [Relatively large scale. No relief.]

AFRICA

General

Chudeau, R. **Le climat de l'Afrique occidentale et équatoriale.** Maps, diagrs. *Ann. de Géogr.*, No. 138, Vol. 25, 1916, pp. 429-462.

Tropical west Africa is a region of great climatic diversity. Between 5°S. and 28°N. there were few meteorological stations before 1900; now there are more than 100 records covering several years, and a detailed discussion of the climates is possible. There are three types of climate here: (1) Saharan, always dry, temperature ranges very great; (2) equatorial, always humid, small variation of the climatic elements; (3) intermediate, or Nigerian, dry-season Saharan, wet-season equatorial. The secondary types, littoral, forest, and mountain are moister, cooler, and less extreme than those of the open interior plains.

In the Sahara, at In-Salah (28°N.), the coldest weather comes at about the same time as the least sunlight, January or December; the warmest month is July. The absolute range in eleven years was from —3.4° C. to 52°; the mean daily range, 18°. The atmospheric pressure here as elsewhere throughout the region follows in reverse order the temperature changes: high in winter and low in summer. The winds of the Sahara are the northeast trades by day; there is calm by night. The air at times is so dry that no trace of moisture can be found with psychrometric readings. The average (42 months) vapor pressure, 7.2 millimeters at In-Salah, is practically the same as the annual of New York City. The potential annual fresh-water evaporation in the Sahara is said to be 3.7 meters. The total rainfall collected at In-Salah in eleven years was the 8.1 millimeters which fell in January and March, 1910.

The equatorial climate at Brazzaville (4°S.) is characterized by a moderate daily temperature range of 11°; and temperatures from September to May by a range of 25° or 26°, April of almost 27°, and July of 21°. The absolute extremes in five years were 12.3° and 38.3°. Rain occurs in all months in this region, with a double maximum. Along the north coast of the Gulf of Guinea the annual rainfall generally exceeds 2,000 millimeters. Debundja at the head of the gulf, at five meters altitude on the west foot of Kamerun Peak, has an eleven-year average of 10,469 millimeters, which is exceeded only by that of Cherrapunji, India, with 11,626 millimeters (Hann). The Guinea forest has a temperature of 26° as compared with 27.5° in the open country to the north. The forests, especially in July, are marked by high pressures. That over the Guinea forest has a strong effect on the general southwest monsoon.

In the intermediate, or Nigerian, region at Niamey (13½°N.), the highest temperatures come in April just before the rainy season, but the highest mean and minimum temperatures occur in May. The daily range is 10° in the wet season and 18° or more in the dry. A diagram shows strikingly the blanketing effect of cloudiness on the temperature range. The equatorial double temperature maxima are found north almost to the Sahara. The littoral climates are locally cool and dry, like the Peruvian, especially between 14° and 21°N., where the ocean water is 16.5° C. to 21.3° C. Some distance off shore the temperature is 27° C. to 28° C. The winds of the dry season are the trades from the Sahara which extend south to about 5°; in the wet season the southwest monsoon prevails as far as Lake Chad (14°N.), but on the west coast the trades come south to 10°N. The floods of the Niger from July to February give the southwest wind the character of a sea breeze on the leeward bank, near Timbuktu. The rainfall increases to 500 millimeters at about 350 kilometers south of the Sahara. Beyond this there are two maxima, irrigation is not necessary, and the vegetation is more varied. A phenomenon of the rainy season is the original ''tornado,'' apparently a heat thunderstorm, with squall, pressure rise, and heavy rain, which comes from the southwest. Some tornadoes travel 75 kilometers an hour. Excellent maps and diagrams illustrate the contribution. CHARLES F. BROOKS

PATTON, C. H. **The lure of Africa.** xiv and 205 pp.; maps, ills., bibliogr., index. Missionary Education Movement of the United States and Canada, New York, 1917. 8 x 5.

Half of the book is given to the remarkable advance of Mohammedanism in Africa. Islam has been firmly established in the Mediterranean countries for about twelve centuries. From these northern states the Mohammedan propaganda has spread over the Sahara, conquered a large part of the Sudan, and is now advancing southward with remarkable impetus. The author describes the Protestant missionary enterprises now in the field or organizing to stem, if possible, this southern march of Islam.

The author and many other writers make a mistake which, strangely enough, has been promoted in every way by the best writers on South Africa. He speaks of the blacks of that region as Kafirs or Kafir tribes and refers to the Kafir war of the Zulus. Long ago Mohammedan propagandists went down the east coast and preached Islam among the blacks of South Africa. They utterly failed to win the natives to the faith of Mohammed and went away disgusted; and the only name they had for the tribes that repelled them was Kafir, an Arabic word meaning ''infidel.'' The whites ignorantly adopted this word as a general term applicable to most of the South African blacks; and missionaries have had their full share in fastening it upon the Bantu tribes of that region.

The author mentions many of the remarkable facts in the present stage of African reclamation. Great Britain, for example, maintains her rule in the colony of Gambia by means of only 75 native police and soldiers. In Nyasaland she has a military force of only 35 native soldiers. In Uganda the Christian population numbers 374,264, according to the latest statistics. The Arab slave dealer has gone out of business, and scores of thousands of black men are engaged in remunerative labor for the whites. Mr. Patton mentions the fact that one Katanga mine employs 5,000 natives, another 2,000; he might have added that 35,000 blacks are working for the whites in the Katanga district. At Dr. Lapsley's missions on the Kasai River nearly 16,000 children are attending the Sunday Schools. As the author says, Africa is now the great field for industrial education, and in every large mission the teaching of agriculture and trades occupies a basal place in the educational system. CYRUS C. ADAMS

SAHARA, INCLUDING EGYPT

BELL, ARCHIE. **The spell of Egypt.** xiii and 36 pp.; map, ills., bibliogr., index. The Page Co., Boston, 1916. 8 x 6. [One of the better class of books on the Nile tour.]

BRIZIO, F. A. **Un viaggio in Tripolitania.** 232 pp.; ills. Società Editoriale Milanese, Milan, 1912. L. 3.50. 9 x 6½.

C[ANA], F. R. **The north-west frontier of Egypt.** Map. *Geogr. Journ.,* Vol. 47, 1916, No. 2, pp. 130-134.

CECCHERINI, UGO, edit. **Bibliografia della Libia (in continuazione alla "Bibliografia della Libia" di F. Minutilli).** ix and 204 pp.; index. Minist. delle Colonie, Rome, 1915. 9½ x 6½.

—— **Egypt, In the western desert of.** *Blackwood's Edinburgh Mag.,* No. 1216, Vol. 201, 1917, pp. 206-222. [Account of the military campaign in Egypt in January, 1916, with details of the attack on the Siwa Oasis.]

EREDIA, F[ILIPPO]. **Contributo alla climatologia del Gebel.** 20 pp.; diagr. Reprint from *L'Agricoltura Coloniale,* Vol. 11, 1917. Istituto Agricolo Coloniale Italiano, Florence.

EREDIA, FILIPPO. **Correlazione tra la temperatura dell'Italia e dell'Egitto.** Reprinted from [*Atti*] *Reale Accademia dei Lincei,* Vol. 26, 1917, No. 11, pp. 607-609. Rome.

EREDIA, FILIPPO. **La neve in Tripolitania.** Ills. *Minist. delle Colonie Boll. di Informazioni,* Vol. 4, 1916, No. 10-11-12, pp. 539-547. Rome. [Notes on snowfall frequency with photographs of snow scenes in Tripoli taken during the unusually snowy years of 1913 and 1915.]

EREDIA, FILIPPO. **Sul clima di Ghadàmes.** 25 pp.; diagr. Reprinted from *Minist. delle Colonie Boll. di Informazioni,* Vol. 4, No. 4-5-6, 1916. Rome. [Ghadàmes is the westernmost oasis of Tripolitania, some 300 miles inland from the Greater Syrtis.]

EREDIA, FILIPPO. **Sul temporale verificatosi a Tripoli nell'ottobre 1915 e sulla distribuzione dei temporali in Tripolitania.** Maps. Reprinted from *Minist. delle Colonie Boll. di Informazioni,* Vol. 3, 1915, No. 12, pp. 1-17. Rome. [On storms in Tripoli.]

HORNEMANN, FEDERIGO. **Diario del viaggio dal Cairo a Murzuch negli anni 1797 e 1798.** (Riproduzione di scritti dispersi o rari.) *Archiv. Bibliogr. Coloniale* (*Libia*), Vol. 2, 1916, No. 1, pp. 43-68; No. 2, pp. 109-138. Florence. [A translation from the original German publication of Hornemann's diary of his journey made toward the end of the eighteenth century—the first in modern times across the northeastern Sahara.]

SMYTH, W. H. (1) **La costa settentrionale dell'Africa.** (2) **Una via aperta verso l'Africa centrale.** (Riproduzione di scritti dispersi o rari.) *Archiv. Bibliogr. Coloniale* (*Libia*), Vol. 1, 1915, No. 2-3-4, pp. 157-198. Florence. [The original was contained in an appendix to Admiral Smyth's book on the Mediterranean, published in London, 1854.]

STROMER, ERNST. **Geographische Beobachtungen in den Wüsten Ägyptens.** 26 pp.; ills., bibliogr. Reprint from *Mitt. des Ferdinand von Richthofen-Tages, 1913.* Dietrich Reimer (Ernst Vohsen), Berlin, 1914.

TROTTER, ALESSANDRO. **Flora economica della Libia: Statistica illustrata delle piante coltivate e delle spontane utili della regione. Seguita da una appendice intorno alle droghe del commercio locale.** 375 pp.; map, diagrs., ills., indexes. (Series: Manuali Coloniali). Minist. delle Colonie, Rome, 1915. 8 x 6.

—— ***Baharia Oasis, Cultivated lands of.*** [In 2 sheets, being a set of 9 maps, as follows, each 1:10,000:] (1) ***The Four Principal Villages: El Qasr, Bawitti, Mandisha, Zabu, and their environs;*** (2) ***Ain el Begum and environs;*** (3) ***Ain Baharia;*** (4) ***Ain Merun and environs;*** (5) ***Gafâra;*** (6) ***El Ris;*** (7) ***Tab el limun;*** (8) ***El Hez and El Gharbia;*** (9) ***El Harra and environs.*** Index, key to positions of inset maps, 1:500,000. Survey of Egypt, [Giza,] January, 1918. [Gives an admirable picture on a large scale of oasis cultivation. There are separate symbols for (1) palm groves, (2) wheat, maize, and barley fields, and (3) rice fields. The soil conditions are differentiated as (1) swamps and marsh lands; (2) salt-encrusted ground; (3) salty ground with scrub; (4) drifted sand; and (5) sandy ground with scrub. Status as in the winter of 1917-18.]

BALL, JOHN. ***Geological map of west-central Sinai.*** 1:50,000. Accompanying as Plate I, "The Geography and Geology of West-Central Sinai," by John Ball, Cairo, 1916. Survey Department, Cairo, 1916. [See the note on "The Geography of the West-Central Sinai Peninsula" in the *Review* for November, 1918, p. 452.]

—— [***Topographical map of Egypt.***] 1:10,000. Sheets: ***N. E. 13-26, 14-24, 15-25, 15-27, 21-12, 21-16, 21-18, 21-20, 22-18, 22-20, 23-14, 23-15; N. W. 23-20, 24-20.*** Surveyed in 1901-11; revised in 1913-14. Survey Department, Egypt.

ASIA

SIBERIA

BLANC, ÉDOUARD. **La colonisation et la mise en valeur de la Sibérie et de la steppe asiatique.** *Ann. de Géogr.,* No. 134, Vol. 25, 1916, pp. 124-142.

BLANC, ÉDOUARD. **Le nouveau réseau des chemins de fer de l'Asie russe.** *Ann. de Géogr.,* No. 136, Vol. 25, 1916, pp. 263-290.

DEMIANOF, V. P. **Siberia—a country of the future.** Ills. *The Americas,* Vol. 5, 1918, No. 1, pp. 8-15. New York.

GORODKOV, B. **Rapport préliminaire sur une excursion dans la contrée de Liapine du gouvernement Tobolsk en 1915.** *Bull. Acad. Imp. des Sci.* [*de Pétrograd*], Ser. 6, 1916, No. 2, pp. 91-94. [In Russian.]

SCHOKALSKY, JULES DE. **La comparaison des mesures de superficie de l'Asie Russe et de ses bassins.** *Atti X Congr. Internaz. di Geogr., Roma, 1913,* pp. 642-651. Reale Società Geografica, Rome, 1915.

SHKLOVSKY, I. W. ("DIONEO"). **In far north-east Siberia.** Translated by L. Edwards and Z. Shklovsky. 264 pp.; maps, ills., index. Macmillan & Co., Ltd., London,

916. $3.00. 9 x 6. [Though the four-year sojourn among the Yakuts along the Koyma River, which is the subject of this book, was made over twenty-five years ago, this ranslation from the Russian is well worth while.]

India

Benton, John. **The Punjab triple canal system.** Edit. by J. H. T. Tudsbery. 2 pp.; maps, diagrs. *Minutes of Proc. of Inst. of Civil Engineers,* Vol. 201, Session 915-16, Part I. London, 1916. [Abstracted in *Engineering* (London), No. 2603, Vol. 00, 1915, Nov. 19, p. 515, and in the *Geogr. Rev.,* Vol. 5, 1918, pp. 149-150.]

Dickinson, Alfred. **Water power in India.** *Journ. Royal Soc. of Arts,* No. 3417, Vol. 66, 1918, pp. 417-426 (discussion, pp. 422-426). London.

Douie, James. **The Panjab, North-West Frontier Province, and Kashmir.** iv and 373 pp.; maps, diagrs., ills., index. (Provincial Geographies of India, T. H. olland, general edit.) University Press, Cambridge, 1916. $1.80. 8 x 5½. [The ook is very rich in content. It deals with a region that includes some of the highest arts of the earth's surface; with rich lowlands, nine-tenths of whose people live in the 4,000 villages of the Punjab, which have a density of population comparable with that f the British Isles; with large parts of desert areas that have been wholly reclaimed y irrigation; and with six climatic zones in an area a little less than that of Texas.]

Dunbar, G. D. **Tribes of the Brahmaputra valley.** *Journ. Royal Soc. of Arts,* No. 3249, Vol. 58, 1915, pp. 290-299. London.

—— [*Topographic map of India.*] 1:253,440. Sheets: ***56 O, Madras and Hyderbad; 56 N, Hyderabad and Central Provinces.*** Survey of India, Calcutta, 1914, 1915. Two maps particularly interesting because portraying the extensive development of rtificial reservoirs or "tanks," such as are used more sparingly in arid parts of the outhwestern United States. The tanks of Hyderabad were constructed in enormous umber in the hollows of an undulating hilly country by the Hindu dynasties, and repreent one of the most elaborate systems of tank irrigation in the world. A brief descripon of the tanks will be found in the *Review,* Vol. 1, 1916, p. 302. The map emphasizes fact of great geographical interest—the high proportion of the people of India that ve in villages and on small holdings of land. India has, in proportion to its total opulation, an astonishingly small number of large cities. (See the "Census of India r 1911," reviewed above, and "British India with Notes on Ceylon, Afghanistan nd Tibet," *Special Consular Rept. No. 72,* U. S. Dept. of Commerce, Washington, . C., 1915.)—D. W. Johnson.]

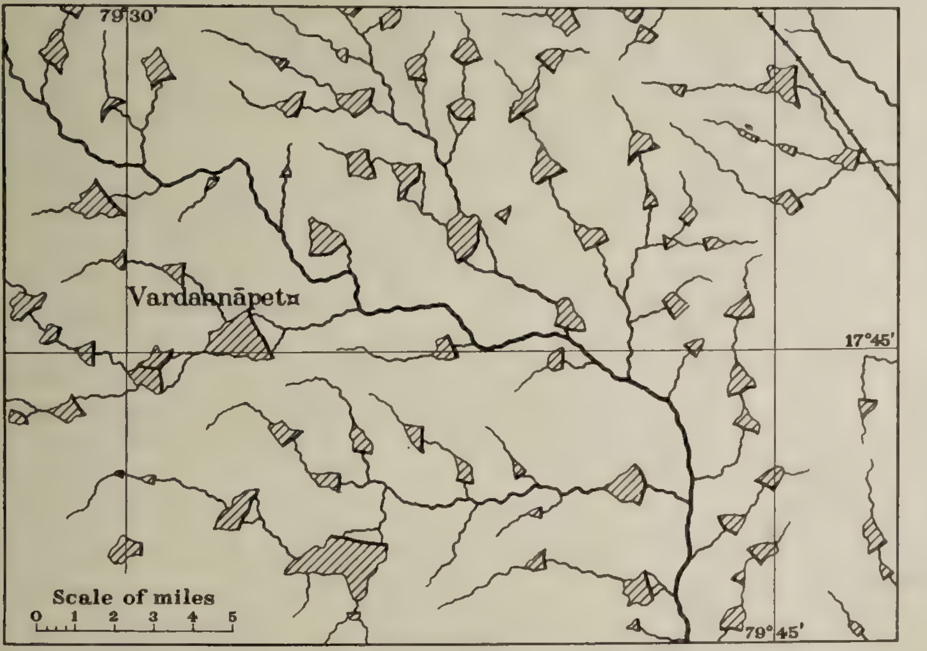


Fig. 1—Map showing a small area in Hyderabad, in which artificial reservoirs abound. Scale, 1:400,000. (Reduced section from the topographic map of India, 1:253,440, Sheet 56 O.)

—— [*Topographic map of India.*] 1:253,440. Sheets: ***78 G, Bengal and Assam*** ***78 H, Bengal; 78 J, Assam and Bhutan.*** Survey of India, Calcutta, 1913, 1914. [Thre maps showing a large, mature, overloaded stream (the Brahmaputra River) whos braided character is remarkably pronounced. The type of braiding is similar to tha shown along the Missouri and Mississippi Rivers on the O'Fallon topographic qua rangle in Missouri and Illinois, but is more extensively developed. In quality execution the maps are scarcely creditable to the India Survey.—D. W. Johnson.]

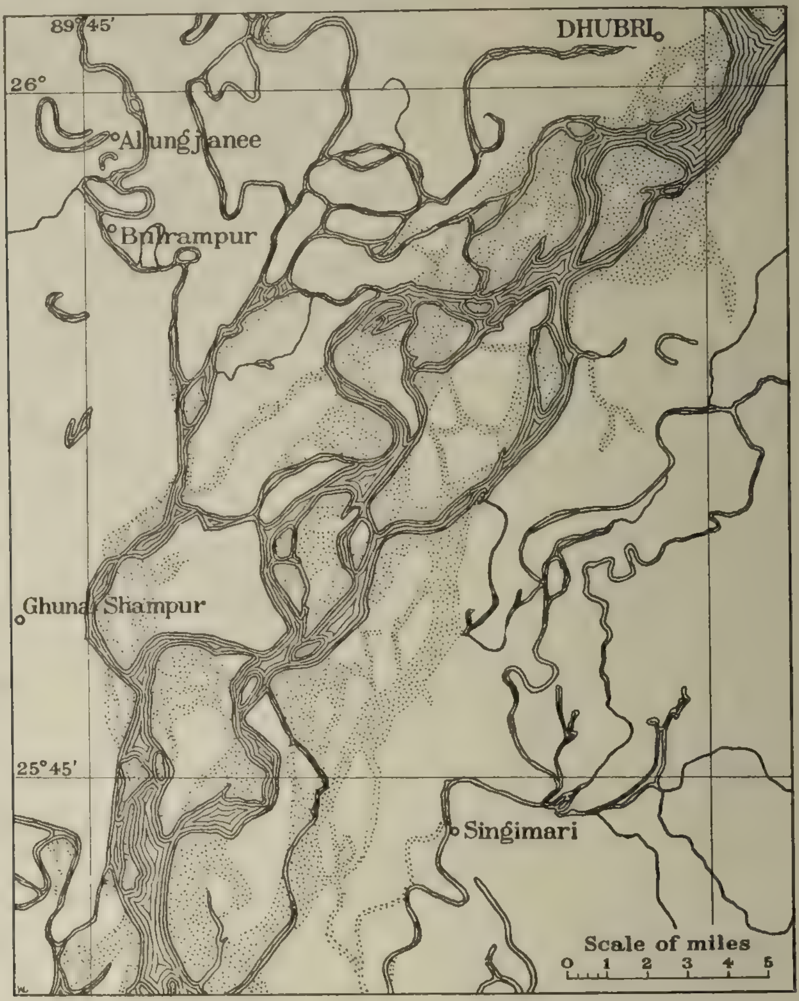


Fig. 2—Map of a portion of the Brahmaputra River at its exit from the Assam trough, showing the braided character of the stream. Scale, 1:400,000. (Reduced section from the topographic map of India, 1:253,440, Sheet 78 G.)

HUMAN GEOGRAPHY

General

Barrell, Joseph. **Probable relations of climatic change to the origin of th Tertiary ape-man.** *Scientific Monthly*, Vol. 4, 1917, No. 1, pp. 16-26. [Abstracted i the *Review*, Vol. 3, 1917, pp. 489-490.]

Chisholm, G. G. **Generalisations in geography, especially in human geograph** *Scottish Geogr. Mag.*, Vol. 32, 1916, No. 11, pp. 507-519.

Hoffman, F. L. **The malaria problem in peace and war.** 101 pp. Prudenti Press, Newark, N. J., 1918. 9 x 6.

Zimmer, G. F. **The use of meteoric iron by primitive man.** Pp. 306-356; ma ills. Reprinted from *Journ. Iron and Steel Inst.*, 1916, No. 2. Offices of the Inst., Lon don, 1916. 8½ x 5½. [A short article with the same title was contributed by th author to *Nature*, as noted in the *Review*, Vol. 5, 1918, p. 343.]

THE
GEOGRAPHICAL REVIEW

OL. VII MAY, 1919 NO. 5

HE NEW BOUNDARIES OF GERMANY ACCORDING TO THE PEACE TREATY

[With separate map, Pl. IV, facing p. 288.]

The changes in the territory of Germany prescribed by the peace treaty
hich was given to the German plenipotentiaries at Versailles on May 7,
919, are represented on the accompanying map on the scale of 1:5,000,000
Pl. IV). The relevant provisions are contained in Section II, which de-
nes the new boundaries of Germany in general, and in Sections III and IV,
which the boundaries of the various areas affected are discussed indi-
idually. The areas affected are: three districts on the Belgian-German
ontier; Alsace-Lorraine; the Saar Basin; Poland; East Prussia; the Free
ity of Danzig; the Memel district; and Slesvig.

In the preparation of the accompanying map and as a basis for the
resent comment the following sources have been used: (1) official sum-
ary of the peace treaty released by the Committee on Public Informa-
on, the Government news agency, and published in the New York after-
oon newspapers of May 7 and the morning newspapers of May 8; (2) press
espatch, dated Paris, May 7, and published in the morning newspapers of
ay 8, describing the new boundaries in detail; (3) map of Germany,
:3,000,000, sent by courier on April 25 by the American Commission to
egotiate Peace in Paris, showing the territorial changes; (4) cablegram
om the American Commission, dated Paris, May 7, giving modifications
f the East Prussian and Slesvig plebiscite areas; (5) map of Denmark,
:1,500,000, sent by courier from Paris on April 30, showing the Slesvig
lebiscite areas as modified. In addition Vogel's "Karte des Deutschen
eiches," 1:500,000 (27 sheets, Justus Perthes, Gotha), and other maps
ere consulted.

THE DISTRICTS ON THE BELGIAN-GERMAN FRONTIER

Section II of the peace treaty summary refers to Germany's prescribed
ssion to Belgium of "two small districts between Luxemburg and Hol-

Copyright, 1919, by the American Geographical Society of New York

land, totaling 382 square miles." Part of the sub-section on Belgium of Section III reads:

> She is to recognize the full sovereignty of Belgium over the contested territory of Moresnet and over part of Prussian Moresnet, and to renounce in favor of Belgium all rights over the circles of Eupen and Malmédy, the inhabitants of which are to be entitled within six months to protest against this change of sovereignty either in whole or in part, the final decision to be reserved to the League of Nations. A commission is to settle the details of the frontier.

The press despatch of May 7 says that the boundary of Germany is to run "east of neutral Moresnet and along the eastern boundary of the Kreise of Eupen and Malmédy." While these three statements are not identical, they are probably merely different phrasings of the same thing, and the last is probably the most accurate. Neutral Moresnet is a small triangular strip of land a little over 2 square miles in extent between Belgium and Germany.[1] Prussian Moresnet is a village lying on its southern border. The Kreise of Eupen and Malmédy are the two border districts of Prussia next to Aachen (Aix-la-Chapelle) on the south. The former contains coal, and the western half of the latter is inhabited by Walloons.

ALSACE-LORRAINE

Section III says: "the territories ceded to Germany by the Treaty of Frankfort are restored to France with their frontiers as before 1871." No hitherto non-existent boundaries are therefore introduced by this clause. The northern and eastern (i.e. the Rhine) limits of Alsace-Lorraine again become the Franco-German frontier. It is unnecessary to describe them as they can be found in any atlas. The only other point of geographic purport to be noted is that "the ports of Kehl and Strasbourg shall be administered as a single unit" "for seven years, with possible extension to ten."

THE SAAR BASIN

The outline of the Saar (Fr., Sarre) Basin, whose coal mines are to be ceded to France and whose territory is to be governed by an international commission until a plebiscite is held fifteen years hence, is best described in the press despatch of May 7. This description helps to identify the points on which is based the outline as shown on the courier map in 1:3,000,000. On this the outline, although the standard representation, is somewhat generalized because of the relatively small scale of the map. The press despatch reads:

> Northern boundary: From the French frontier west of Merzig a line east by north

---

[1] On Moresnet and its peculiar political status see:

Charles Hoch: The Neutral Territory of Moresnet, Cambridge, Mass., 1882 (translated from the author's "Un territoire oublié au centre de l'Europe," *Jahresbericht der Geogr. Gesell. in Bern* Vol. 3 for 1880-81, pp. 139-148).

René Dollot: Un condominium dans l'Europe centrale: Moresnet, *Ann. des Sci. Polit.*, Vol. 16, 1901 pp. 620-634.

F. Schröder: Das grenzstreitige Gebiet von Moresnet, Aachen, 1902.

Spandau: Zur Geschichte von Neutral-Moresnet, Aachen, 1904.

> a point 5 miles north of St. Wendel. The eastern boundary runs thence southeast pass east of Homburg and then south to the French frontier south of Zweibrücken as to pass west of that place.

y “French frontier” is meant the new frontier as provided for by the eaty, i.e. in this case the northern boundary of Lorraine. Merzig is a wn on the Saar in 49° 26′. The treaty summary gives the additional formation that the Saar Basin “includes . . . the valley of the Saar as r as Saarhölzbach,” a village 5 miles north of Merzig in an air line. St. Vendel, Homburg, and Zweibrücken are towns on or near the Blies, a ght tributary of the Saar, the two last in the Bavarian Palatinate. If is outline be plotted on a map showing the coalfields, such as that in e *Geographical Review,* Vol. 6, 1918, facing p. 112, it will be seen to close the entire extent of the mine holdings in that area.

POLAND

The section concerning Poland is the most important of the European rritorial provisions of the treaty. It affects the largest area, and it aws inward the eastern boundary of Germany so that at its westernmost oint it is only 102 miles from Berlin. A sufficiently detailed and, indeed, uite precise description, as shown when checked by the courier map, is iven in the press despatch of May 7. The treaty summary merely says: Germany cedes to Poland the greater part of Upper Silesia, Posen, and e province of West Prussia on the left bank of the Vistula,” leaving a oubt as to whether “greater part” applies also to Posen and West Prussia est of the Vistula. The boundary according to the press despatch is as llows:

> From the angle east of Neustadt of the 1914 German frontier with Austria north-ard, passing west of Oppeln, to the most southerly point of the province of Poznania osen); thence the western boundary of Poznania to the Bartsch River; thence the artsch River to a point about 10 miles east of Glogau; thence the boundary of znania northeast to the re-entrant southwest of Lissa; thence northeast [should read rthwest] to [a point] west of Kopnitz (45 miles southwest of the city of Posen); ence north along a line of lakes and crossing the Warthe River to meet the boundary Poznania 8 miles west-northwest of Birnbaum; thence east-northeast to the Netze ver; thence up the Netze River to its bend 8 miles southwest of Schneidemühl; thence st of Schneidemühl; thence northeast about 5 miles west of the Schneidemühl-Konitz ilway and passing east of Schlochau to a point about 3 miles northwest of Konitz; ence north to the old boundary of West Prussia, which it follows to the salient 5 miles utheast of Lauenburg; thence north to meet the Baltic about 8 miles west of the l boundary of West Prussia.

Most of the places mentioned can be found in any general atlas. The rrect outline, copied from the courier map, is shown on the accompanying ap. In its local detail the boundary is to be laid down by a field boundary mmission of seven, five representing the allied and associated powers d one each representing Poland and Germany, to be constituted within teen days of the signing of the peace treaty.

If the western limit of Poland as thus defined be compared with an ethnographic map it will be seen to represent a very close approximation of the Polish-German linguistic frontier. The fact that it approaches so closely to Berlin is due to the fact that the area of Polish nationality lies this far west—incidentally evidence of the eccentric position of Berlin as the German capital. The inclusion of the Upper Silesian coalfields in Poland is likewise ethnographically justified as they lie in an entirely Polish region. The strip of Baltic sea coast allotted to Poland also lies in predominantly Polish territory, being inhabited by the Kashubs, a Polish tribe. It contains a minor port, Putzig, protected by the barrier beach of Hela; but, of course, Poland's outlet to the sea will be through Danzig.

EAST PRUSSIA

East Prussia is to be German territory, separated from the main body of Germany but with free communication across the intervening Polish territory. Its boundaries are defined in the press despatch of May 7, as follows:

> (A) The new boundary of East Prussia (with reservations for plebiscite as in B) leaves the Baltic, runs southwest up the Nogat River, then south up the Vistula to about 12 miles southwest of Marienwerder; thence generally east to the former boundary [of East Prussia]; thence southeast to the former boundary south of Neidenburg; thence the former boundary to the Niemen River; thence the Niemen River to a point [south?] of Nidden; thence west by north to the Baltic.

The final sovereignty over two portions of this territory is to be determined by plebiscite. Their extent is given as follows in the press despatch:

> (B) Boundaries of areas for plebiscite. (1) Marienwerder area: Between the boundary of East Prussia as defined above and a line running from a point on the Nogat southwest of Elbing eastwards to the old western boundary of East Prussia, then the latter boundary southwards. (2) Allenstein area: The old western boundary of East Prussia on the west and then a line running generally east-northeast to include the Regierungsbezirk Allenstein and the Kreis Oletzko.

Further light is shed on these boundaries by our other sources of information. Between the Baltic and the mouth of the Nogat the boundary must cross the barrier beach called the Frische Nehrung; according to the courier map it seems to do this between the hamlets of Vogelsang and Pröbbernau. The Nogat has a somewhat extensive delta; the boundary seems to follow the easternmost arm, leaving to East Prussia the access to Elbing, the Elbinger Fahrwasser. The segment of the boundary described as running generally east from a point on the Vistula 12 miles southwest of Marienwerder is probably the southern limit of the Kreise Marienwerder and Rosenberg. (This would seem to be confirmed by the phraseology of Section IV, cited below. The reference in Section II to "the area between East Prussia and the Vistula north of latitude 53 degrees 3 minutes" should doubtless read 53° 30′ and is only a paraphrase of the same thing.) The segment running thence southeast is, first, the old western boundary of East Prussia in so far as it coincides with the western boundary of the Kreis Osterode and, then, as shown on the courier map, a line cutting off from East Prussia the southwestern corner of the Kreis Neidenburg. (For the location of the Kreise, or circles, in this region, see inset III on the accompanying map.)

Marienwerder Plebiscite Area

There is a slight ambiguity as to the extent of the Marienwerder plebiscite area. The press despatch and the Section IV treaty summary version are identical, if, as seems plausible, the ''line running from a point on the Nogat southwest of Elbing eastwards to the old western boundary of East Prussia'' of the former is the same as the northern limit of the Kreis Marienburg; for the latter defines this plebiscite area as ''comprising the circles of Stuhm and Rosenberg and the parts of the circles of Marienburg [east of the Nogat] and Marienwerder east of the Vistula.'' The representation on the courier map would, however, lead to a somewhat different interpretation. It shows as the new western boundary of East Prussia a line running southeast from the same ''point on the Nogat southwest of Elbing'' mentioned in the press despatch and cutting across the Kreise of Marienburg, Stuhm, and Mohrungen, then coinciding with the western limit of the Kreis Osterode, and finally cutting off the southwestern corner of the Kreis Neidenburg, as mentioned above, to reach the southern boundary of East Prussia. It would seem that this was the line first decided upon as the western boundary of East Prussia and that the creation of the Marienwerder plebiscite area was not decided upon until later, for the cablegram of May 7 from the American Commission referred to as one of our sources says ''add to Allenstein plebiscite area the area on the west reaching to the Vistula River and bounded on the south by the southern limit of the circles Marienwerder and Rosenberg to join the line drawn on the map.''

Allenstein Plebiscite Area

There is no such ambiguity as to the extent of the Allenstein plebiscite area. Section IV of the treaty summary defines it as—

> in the regency [same as Regierungsbezirk, below] of Allenstein between the southern frontier of East Prussia and the northern frontier of the Regierungsbezirk Allenstein from where it meets the boundary between East and West Prussia to its junction with the boundary between the circles of Oletzko and Angerburg, thence the northern boundary of Oletzko to its junction with the present frontier—

or, in other words, the whole of the Regierungsbezirk Allenstein together with the Kreis Oletzko. The courier map shows the area in the same extent except for the southwestern portion of the Kreis Neidenburg, which is excluded, and it is consequently thus represented on the accompanying map.

The Allenstein area, although ethnographically Polish, was not allotted outright to Poland probably because of the fact that its inhabitants, the Masurians, are Protestants and might possibly prefer to join their German co-religionists rather than their Polish kinsmen, who are Catholics.

Extent of East Prussia

Because of these various differences it is not entirely clear whether the Marienwerder area is to be considered a part of East Prussia which will decide whether it wishes to join Poland or a part of Poland which will decide whether it wishes to join East Prussia. The former seems more probable, as the area is inhabited mainly by Germans. A phrase in the subsection on East Prussia of Section IV of the treaty summary referring to the "German territory on the right bank of the Vistula" would also seem to point to this conclusion. The Polish-German frontier in this region has accordingly been thus represented on the accompanying map. The definite boundaries of East Prussia will, of course, not be laid down until after the plebiscites have been held.

The Free City of Danzig

The boundaries of the area to be known as the Free City of Danzig are described in detail in the press despatch of May 7 (see inset II of accompanying map). The general shape of the area is well characterized in Section II of the treaty summary, as follows:

> The Danzig area consists of the V between the Nogat and Vistula Rivers, made into a W by the addition of a similar V on the west, including the city of Danzig.

The boundaries are given as follows in the press despatch:

> On the east from the Baltic to the junction of the Nogat and the Vistula, the boundary of East Prussia as described in (A); on the south and west the Vistula River northward to about 15 miles south of Danzig; thence west by south for about 16 miles; thence west-northwest for about 8 miles to the Lonkener See; thence to the Pollenziner See; thence northeast for about 12 miles to about 7 miles southwest of Danzig; thence north, passing east [west?] of Oliva; thence northeast passing between Koliebken and Zoppot to the Baltic about 9 miles north-northwest of Danzig.

Lonkener See and Pollenziner See are two small lakes not shown on the maps generally available. They are shown on Sheet 98 (Berent) of the topographic map of Germany in 1:100,000. The actual boundaries of the area are to be delimited by a commission appointed within six months of the signing of the peace treaty.

The Memel District

The extent of the territory about Memel to be ceded by Germany is not quite clear. A paragraph in the subsection on East Prussia of Section IV reads:

> The northeastern corner of East Prussia about Memel is to be ceded by Germany to the associated powers, the former agreeing to accept the settlement made, especially as regards the nationality of the inhabitants.

Section II says "She [Germany] loses sovereignty over the northeastern tip of East Prussia, 40 square miles north of the Memel River." The courier map shows all the territory north of the Niemen (or Memel) River as to be ceded by Germany. This seems the more likely as this whole area is inhabited by Lithuanians and will probably be allotted to an independent state of Lithuania. The size of this area as given in the treaty summary is obviously incorrect, as even 40 square miles of the northern tip of East Prussia would not include Memel. The territory north of the Niemen is about 900 square miles.

SLESVIG

The subsection headed "Denmark" of Section IV of the treaty summary reads:

> The frontier between Germany and Denmark will be fixed by the self-determination of the population. Ten days from the peace German troops and authorities shall evacuate the region north of the line running from the mouth of the Schlei, south of Kappel, Schleswig, and Friedrichstadt along the Eider to the North Sea south of Tönning; . . . and the territory [shall be] administered by an international commission of five, of whom Norway and Sweden shall be invited to name two.
>
> The commission shall insure a free and secret vote in three zones. That between the German-Danish frontier and a line running south of the island of Alsen, north of Flensburg, and south of Tondern to the North Sea north of the island of Sylt, will vote as a unit within three weeks after the evacuation. Within five weeks after this vote the second zone, whose southern boundary runs from the North Sea south of the island of Föhr to the Baltic south of Sygum(?), will vote by communes. Two weeks after that vote the third zone running to the limit of evacuation will also vote by communes. The international commission will then draw a new frontier on the basis of these plebiscites and with due regard for geographical and economic conditions. Germany will renounce all sovereignty over territories north of this line in favor of the associated governments, who will hand them over to Denmark.

The boundaries between the zones are given more in detail in the press despatch of May 7, as follows:

> Areas for plebiscite in Schleswig: Between the present Danish frontier and a line running (1) through Flensburgfjord, south of Tondern and north of the island of Sylt; (2) from a point on the Baltic coast about eight miles east by north from Flensburg, southwest to a point about fifteen miles southwest of Flensburg, then northwest to Scholmer Au, just east of Soholm, thence the Scholmer Au to the coast, thence south of the islands of Föhr and Amrum in the North Sea; (3) along the course of the Schlei, thence south of Schleswig to Reider Au, then down the stream, but passing east and south of Friederichstadt before meeting the Eider, which it follows to the sea.

The boundary between the middle and southern zones is given still more precisely in the cablegram of May 7 from the American Commission referred to at the beginning of these notes. The relevant passage, with the garbled names of the original restored as well as possible, reads:

> The third line [i.e. the northern boundary of the third zone] is to be drawn from Flensburger Fjord on the east between Bockholmwik and Langballigholz in the position of a Z in a general southwesterly direction as far as (?) south of Ringsberg, north of Rüllschau and Maasbüll, southeast of Kleine Solt, north of Frorup, north of Wanderup,

north of Oxlund, southwest of Joldelund and Goldelund to the southern border of the circle of Tondern, which the line then follows westward to the North Sea, passing along the channel south of the islands of Föhr and Amrum.

The places named are practically all inconsequential villages that are shown, however, on the aforementioned Vogel's ''Karte des Deutschen Reiches.'' By these descriptions the second and third lines, i.e. the limits of the third zone, are very precisely defined. The first line, between the first and second zones, is shown more precisely than indicated in the descriptions on the map in 1:1,500,000, sent on April 30 by the American Commission to Negotiate Peace. All three are shown on inset I on the accompanying map as accurately as the scale permits. The names are there given in their Danish form but can readily be identified with those mentioned in the text.

These provisions of the treaty for the self-determination of Slesvig skillfully take into account the conditions obtaining in that area. It will be noticed that the northern zone is to vote as a unit while the middle and southern zones are to vote by communes. The northern zone is practically coincident with the area completely Danish in speech and sympathy. Of the middle zone the North Sea islands and the coast for about 6 miles inland are inhabited by Frisians, ''about 15,000 souls, who are neither German nor Danish, and who will be satisfied if their local liberties are left.''[2] In the center of the middle zone the population is mixed Danish and German, but with Danish speech and sympathy predominant. The eastern part of the middle zone, including the city of Flensburg (6,000 Danish-speaking out of 60,000), is preponderantly German. This is also the case with practically all of the southern zone. Hence the anxiety manifested by the Danes since the publication of the peace treaty (as reported in a cablegram received by the Danish Legation in Washington on May 13 and in other press despatches) that districts purely German may nevertheless vote for union with Denmark in order to escape German taxation.[3]

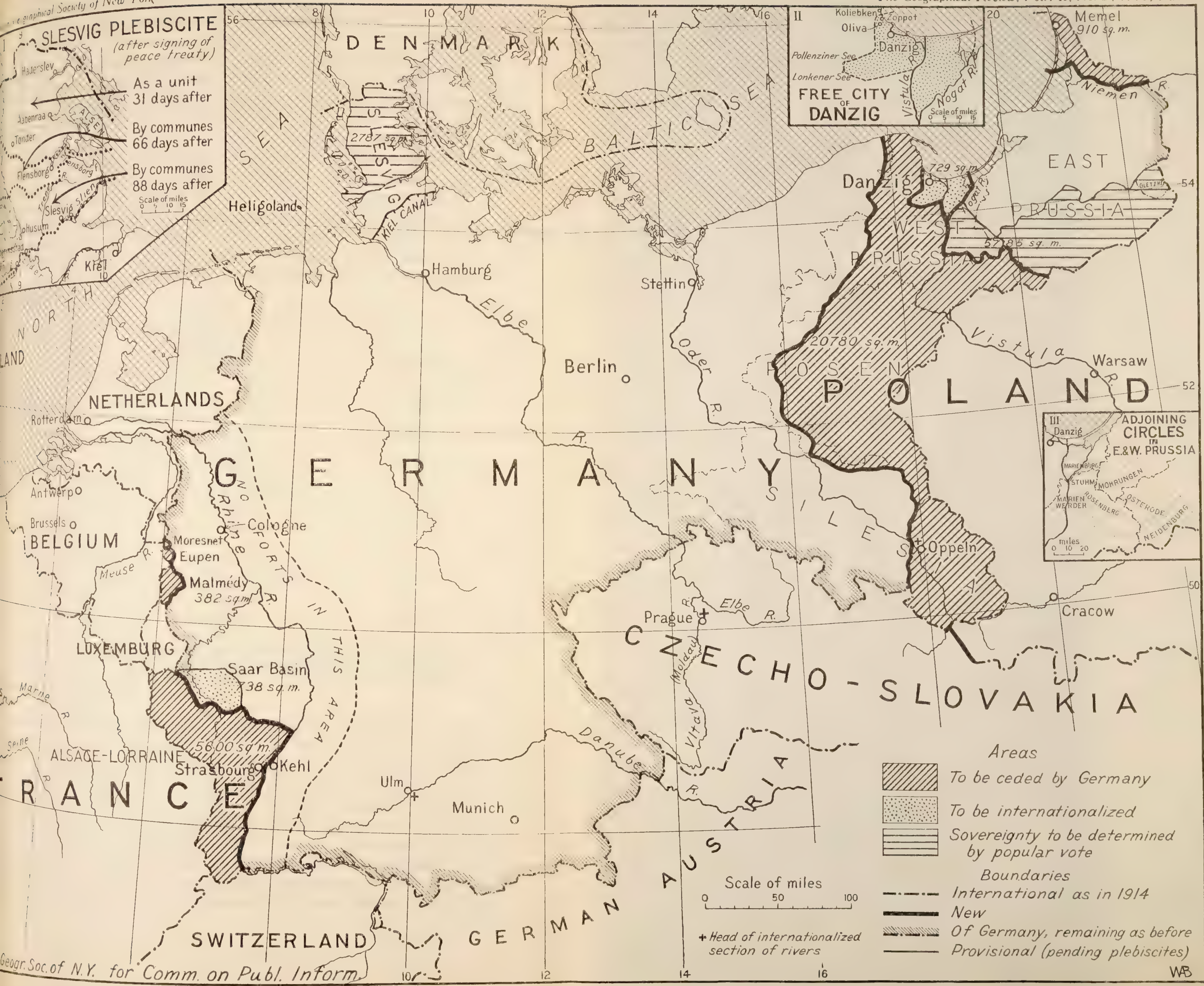
THE SIZE OF THE AREAS AFFECTED

The size of the areas affected is given in Section II of the treaty summary. Some of the figures there given are obviously incorrect, as has been pointed out in the case of the Memel district. The possibility of error in the determination of areas not coincident with hitherto existing political units and in the transmission of figures by cable is patent. Indeed, in

---

[2] Jacques de Coussange: Slesvig since the Armistice, *The New Europe*, Feb. 20, 1919, pp. 132-136, reference on p. 133. On the recent aspect of the Slesvig question see also Erik Moller: Danish Aspirations, *ibid.*, March 20, 1919, pp. 226-231, with linguistic map of Slesvig-Holstein.

[3] Economic conditions might also tend to bring about this result, for, says Coussange (*op. cit.*, p. 136), the interest of the big German business men "bids them separate from Germany and to share the fate of northern Slesvig. Eighty per cent of their ties are with the North; to the south they have the serious rivalry of Hamburg and Bremen. The shipbuilding yard which is Flensborg's chief industry gets its steel from Sweden and Alsace; even before the war its coal came from England. If relations with these countries were difficult, its prosperity would be threatened. The yard owners are afraid of being involved in the ruin or decline of the German merchant marine."



Geogr. Soc. of N.Y. for Comm. on Publ. Inform.

the original cable the total area of the districts on the Belgian-German frontier was given as 989 square miles, a figure which was corrected in a supplementary despatch to 382 square miles, showing that the compiler had overlooked changing square kilometers into square miles. Under the circumstances it has been thought advisable to determine the areas independently as far as the material at hand would allow. This has been done by plotting all the areas not previously existing as administrative units on the scale of 1:1,000,000 (area allotted to Poland in 1:3,000,000) on millimeter cross-section paper and determining the number of square millimeters, which, on the millionth scale, equals the number of square kilometers. The values thus obtained, transformed into square miles and compared with the figures given in the treaty summary, are given in the following table.

AREA OF PARTS OF GERMANY AFFECTED BY THE PEACE TREATY
(in square miles)

	AS DETERMINED		AS GIVEN IN TREATY SUMMARY
Neutral Moresnet	2		
Kreis Eupen	68*	382	382
Kreis Malmédy	314*		
Alsace-Lorraine	5,608		5,600
Saar Basin	784		738
To Poland	20,780		27,686
Marienwerder plebiscite area	954	5,723	5,785
Allenstein " "	4,769†		
Free City of Danzig	729		729
Memel district	910		40
Slesvig plebiscite areas:			
Northern zone	1,533	2,878	2,787
Middle zone	450		
Southern zone	895		
Total	37,796		43,747

---

* E. g., Census of 1900, "Statistik des Deutschen Reiches," Vol. 150, section containing tables, p. 16.

† Regierungsbezirk Allenstein, 12,026 sq. kilometers, + Kreis Oletzko, 855 sq. km.,—southwestern corner of Kreis Neidenburg, computed as 528 sq. km.=12,353 sq. km.=4,769 sq. m. (areas from "Preussische Statistik," Vol. 234, Part I, Berlin, 1913).

In general the corresponding values in the two columns tally very well, especially when the various factors involved, which necessarily lack preciseness, are taken into account. Except for the obviously incorrect value of 40 square miles for the Memel district, the only noteworthy discrepancy is between the two figures for the territory to be ceded to Poland. It seems probable that the figure given in the treaty summary is too large; possibly it was inadvertently made to include Danzig and the Marienwerder and Allenstein plebiscite areas. Turning now to the total area and taking the smaller figure, 37,796 square miles, for the more correct, it will be seen that the parts of Germany affected represent 18 per cent, or over one-sixth, of its area of 208,834 square miles. Even on the assumption that th plebiscites decide that the German-speaking part of Malmédy, the Marie werder area, and the southern zone of Slesvig should remain German, thi would diminish the territory lost to Germany only by about 2,000 squa miles.

OTHER TREATY PROVISIONS OF GEOGRAPHICAL INTEREST

Some of the other treaty provisions of geographical interest are: pe mission to Belgium and to the interested allied governments each to co struct a Rhine-Meuse canal (Section X); assurance of free access to the se for Czechoslovakia, both through Trieste and Fiume and Hamburg an Stettin (Section X); and the internationalization of the Elbe belo Prague on the Vltava (Moldau), of the Oder below Oppeln, of the Nieme below Grodno, and of the Danube below Ulm (Section XI). The pro visions affecting non-European areas (Section V) relate to changes i sovereignty over these areas *in toto* and do not involve boundary changes they are therefore not discussed here.

May 14, 1919

LIVING OFF THE COUNTRY” AS A METHOD OF ARCTIC EXPLORATION

By VILHJÁLMUR STEFÁNSSON

While the geographical work of the Canadian Arctic Expedition of 913-1918, during its five years of discovery and exploration, has been onsiderable,[1] it will perhaps be thought more important that we have ntroduced a new method in polar exploration, a method which makes ossible a great reduction of equipment and increases the safety as well s the possible length, both in mileage and in time, of journeys over the ea ice or along uninhabited lands.

It is, however, true of this method, as of most others, that it is new n one sense only. We built on the work of our predecessors. In the orties of last century, after the death through illness of Sir John Frankin and a few of his men, the remainder starved to death in the vicinity of King William Island. A few years later Dr. John Rae, of the Hudson's Bay Company, who understood Arctic conditions and is the pioneer in our sort of exploration, wintered in the same vicinity, at Repulse Bay, in safety and comfort on game killed with exactly the same sort of weapons the Franklin party had. The difference between safety and disaster lay in the methods of the two parties. The fact that Franklin's men numbered over a hundred should not have made it any more difficult for them to live on the resources of the country than it was for Rae's party of about twenty, since Eskimos in the same vicinity sometimes travel in even larger parties, although their arms and their equipment are distinctly inferior to those of Franklin's men.

In the further search for relics of the Franklin expedition, Schwatka and Gilder lived as guests of the Eskimos near King William Island, and later so did Charles Francis Hall. The early chapters of the account of Hall's third expedition show that had he lived he would probably have profited in the far northern waters of Greenland by the knowledge gained at King William Island.

In the nineties of the last century Nansen and Johansen made their remarkable journey north from the *Fram* and later south to the Franz Josef archipelago. After reaching these islands they lived on walrus meat, but while they were on the moving ice of the ocean they depended only on the food on their sledges and later killed some of their dogs and fed

---

[1] The activities of the expedition may be followed in these pages, viz.: *Bull. Amer. Geogr. Soc.*, Vol. 45, 1913, pp. 288, 525-526; Vol. 46, 1914, pp. 51-52, 184-191, 520-523, 773-774; Vol. 47, 1915, pp. 766-769; R. M. Anderson: Recent Explorations on the Canadian Arctic Coast, *Geogr. Rev.*, Vol. 4, 1917, pp. 241-266, with 2 maps in 1:15,200,000 and 1:4,500,000; *Geogr. Rev.*, Vol. 5, 1918, pp. 238-241; Vilhjálmur Stefánsson: The Activities of the Canadian Arctic Expedition from October, 1916, to April, 1918, *Geogr. Rev.*, Vol. 6, 1918, pp. 354-369, with map in 1:9,500,000.

hem to the other dogs—clear proof that they either did not realize that ame could be secured at sea or thought it actually absent. In his joureys northward over the ice from Greenland and from Grant Land, Adniral Peary used to secure game for his men and his dogs when he got ack to shore after his dashes northward into the ice, but he placed no lependence on getting game while at sea. In his winter camps he also ised to secure, through his Eskimo hunters, large quantities of fresh meat, vhich effectively prevents the scurvy that has been so annoying in most olar expeditions and so disastrous even in some of the more recent ones. The commanders or medical officers in these instances, with an astonishing bliviousness to the lessons of experience, have vainly tried to prevent scurvy with vegetables, fruits, and lime juice brought from home.

In 1904 David Hanbury with two white and twenty Eskimo companions lived on game for about six months on a journey from Chesterfield Inlet north to the Arctic coast, thence west to the Coppermine River and south to Great Bear Lake and the Hudson's Bay Company posts on the Mackenzie. The Eskimos did practically all the hunting which supported this party.

Feasibility of a Diet of Fish and Meat

As guest of the Eskimos, I spent the winter of 1906-1907 in the Mackenzie delta. For fifteen years those Eskimos had been in the habit of purchasing yearly more or less of white men's provisions from the whalers at Herschel Island; but that year no whalers had entered the Arctic, and no such foods were obtainable in the delta. The family I stayed with had a little tea, purchased from the Hudson's Bay Company at Fort MacPherson; but, as they were very fond of it and I was not, I drank it not more than twice a week, while they drank it two or three times a day. This tea was the only article of white man's food. There was no salt nor other seasoning, no flour nor other item of groceries, and no fruits or vegetables in any form. It was here that I learned from experience what I already knew theoretically—that salt is not necessary for health, and that the desire for it disappears in about three months when one is without it. Our food was fish only—some fresh, some summer-dried, and some that had become rotten in storage during the summer months. After living on these three kinds I became fond of all of them and found that at the end of four months I was, so far as I could judge, in as good a physical and mental condition as I have ever been. I weighed ten pounds more than I had ever weighed before and about fifteen pounds more than my normal weight since, when I have been living in cities or elsewhere on civilized diet. I have known no white man who has lived on an exclusive meat diet for a year or more who has any marked desire to go back to a varied diet. Several of our men, while they were in the north and after returning south, have told me they found both that the elaborate diet of civilization does not agree with them so well as meat and that they do not enjoy their meals as much.

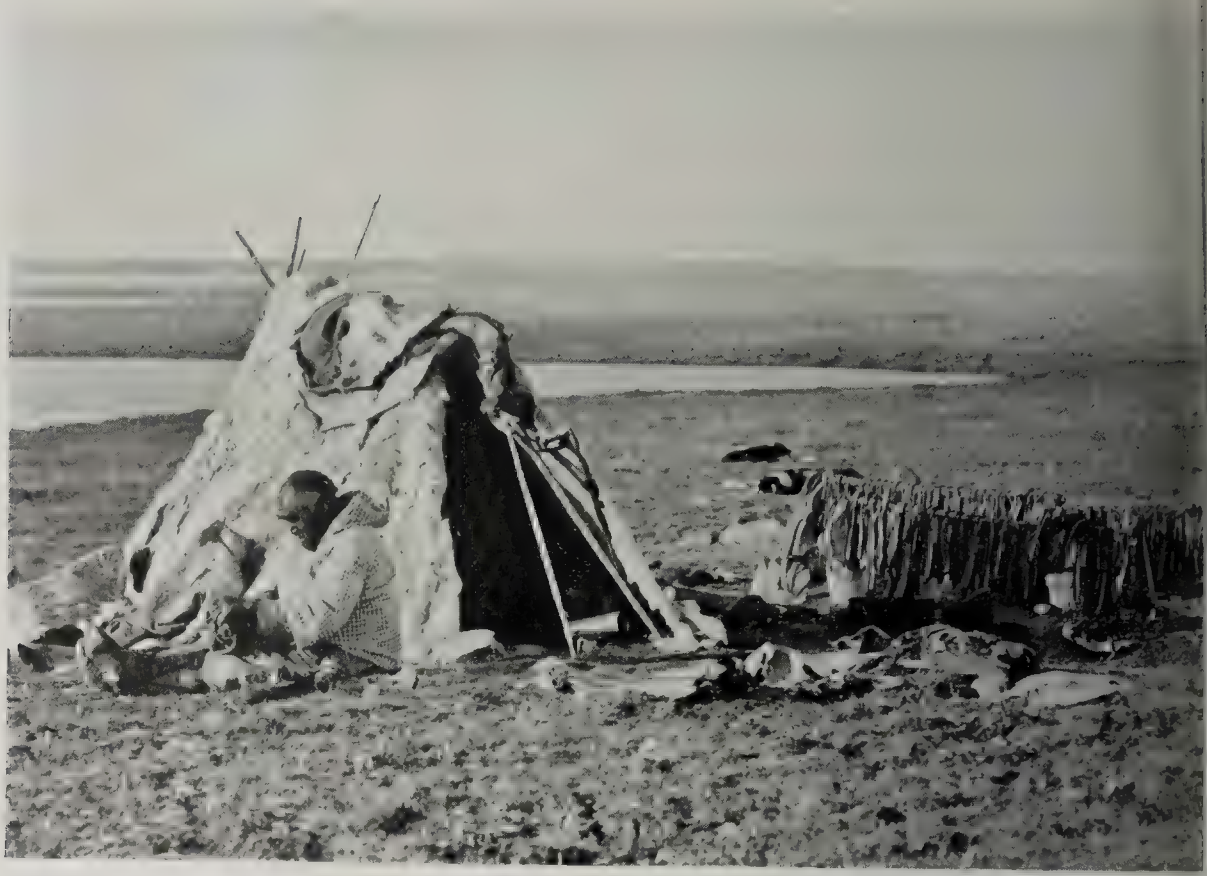


Fig. 2.

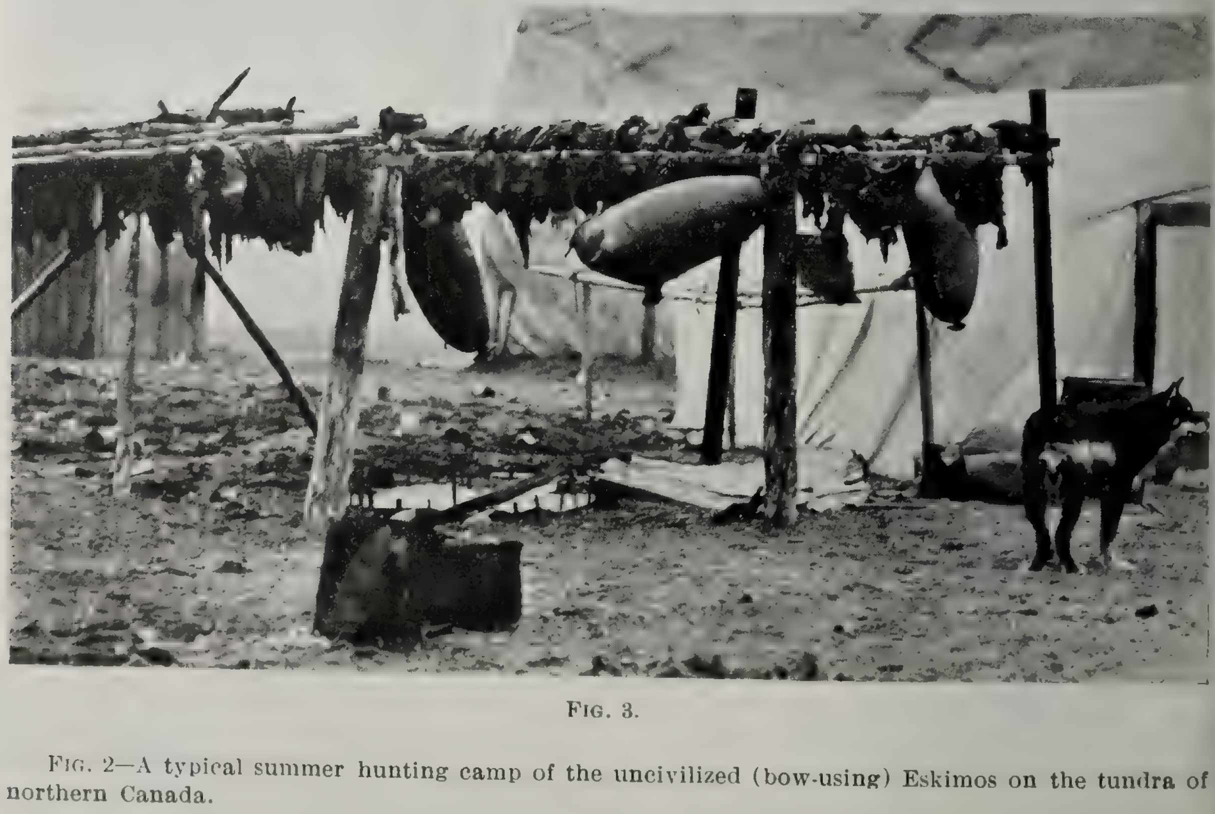


Fig. 3.

Fig. 2—A typical summer hunting camp of the uncivilized (bow-using) Eskimos on the tundra of northern Canada.

Fig. 3—Food caches, Baillie Island, July, 1916. Note the inflated seal skins.

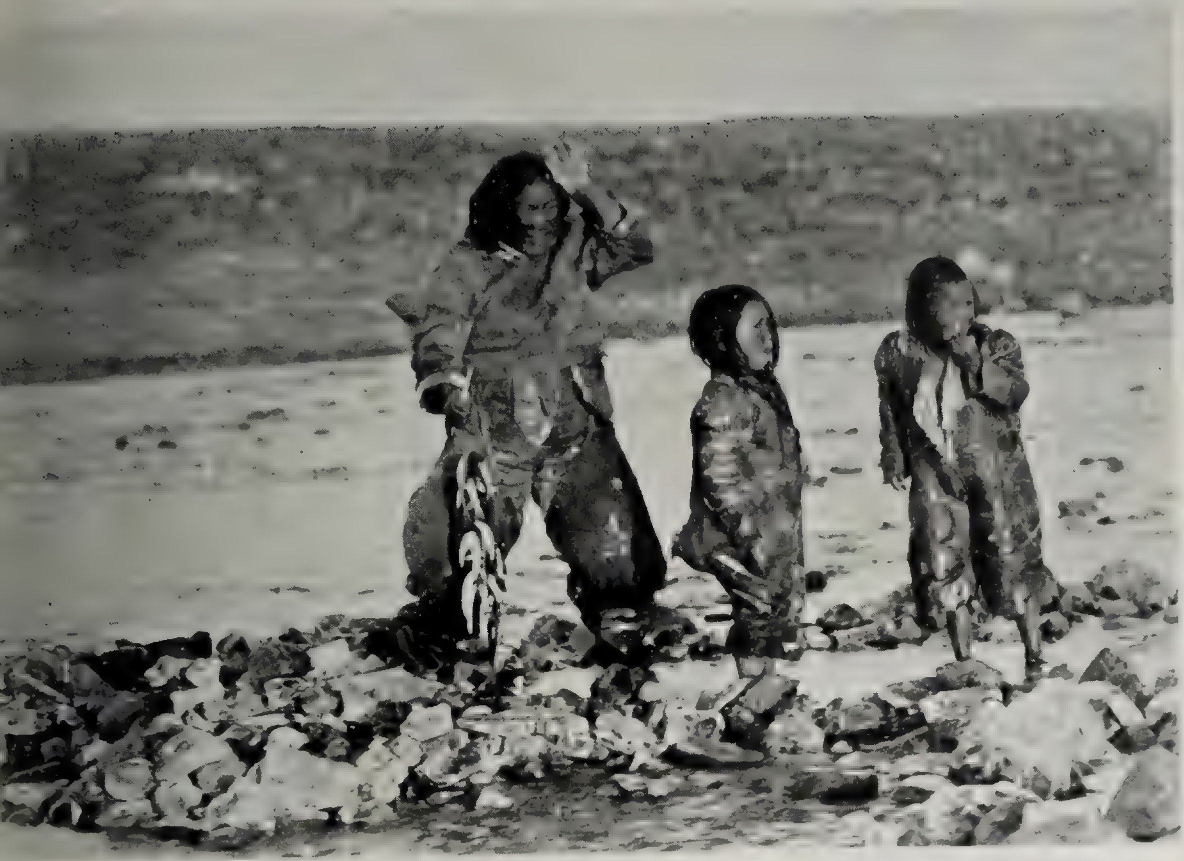


FIG. 4.

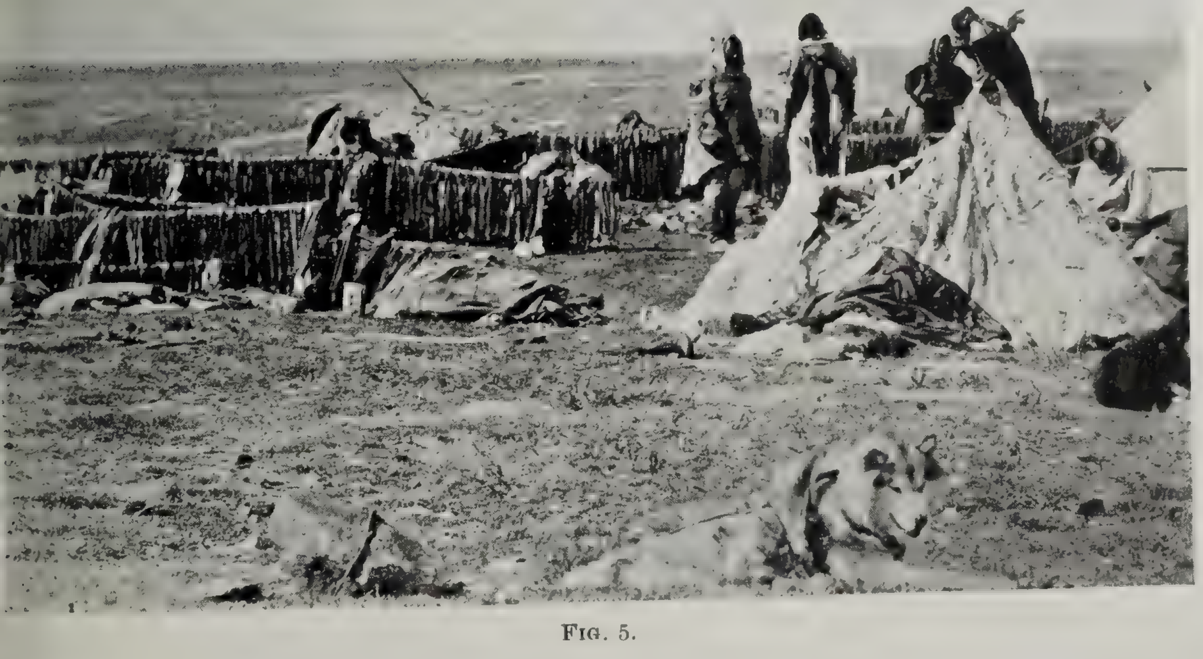


FIG. 5.

FIG. 4—Eskimo woman and girls at the fishing creek, Dolphin and Union Strait, June, 1916. (For a view of salmon spearing at the same place see Fig. 3, *Geogr. Rev.*, Vol. 4, 1917, p. 85.)

FIG. 5—Fish drying at a summer camp of the Eskimos.

It was clear to me from this demonstration that the food which the Arctic supplies is adequate for health and that one likes it when he gets used to it. The only question then was, Could meat or fish be secured in places that needed exploration? If that were possible, then a party suitably armed and otherwise equipped could go anywhere, stay anywhere, and make exploratory journeys of any length in the Arctic.

During the years 1908-1912, when at work under the auspices of the American Museum of Natural History and the Geological Survey of Canada on the north coast of Canada and Alaska and also in the interior on Horton River and near Great Bear Lake as well as in Victoria Island, my party frequently lived several months at a time and once more than a year at a time on the product of our rifles and fish nets. The fishing was always inconsiderable, and on our longest and most difficult journeys we never tried to get fish, except occasionally for the "fun of it" when encamped in what happened to be good fishing localities. When you have lived for two or three years on caribou meat, you wouldn't go a mile out of your way to get food of any other kind, unless it were for reasons of ostentation, as with the Eskimos, who want to have their neighbors know that they can afford to eat expensive imported foods.

Abundance of Animal Life in the Arctic

Our second expedition in the Arctic had thus proved to my satisfaction that any man who knows the ways of wild animals and the hunting and living methods of the Eskimo can load on one dog team all the equipment he needs for a journey of a year or even several years. That the same could be done at sea would appear an inevitable corollary of that conclusion of oceanography, so frequently emphasized by Sir John Murray and others, that the amount of floating animal life per cubic unit of ocean water is least at the equator and increases towards the poles. Although laymen commonly do not make this generalization and not infrequently assume the opposite, still the fact is really one of the best attested by universal experience. There are no well-known fisheries of importance in tropical waters. The coast cities of Florida and Georgia, for instance, are not fishing cities in the sense that Gloucester and Marblehead are, and even the Gloucester fishermen sail northerly from their homes, for the cod are on the Newfoundland Banks and the halibut around Iceland. In Europe the Spaniards have to import the fish they eat in Lent, and the harvest of the sea is rich about the British Isles and richer still up on the coast of Norway.

So far as we knew there was no reason why this law should break down when the fringe of the Arctic was reached, and I for one believed that the polar sea was richly supplied with animal life, if one only knew how to find it and get it. If polar explorers had traveled over the sea ice without reporting the seals I felt sure were there, this to me was no stranger than at tourists frequently sail from New York to Liverpool and cross the ewfoundland Banks without noticing anywhere the undisputed cod.

Over Sea Ice with a Single Dog Sledge

We found ourselves on the north coast of Alaska in the winter of 1913-914, with two ships still safe, the *Alaska* and the *Mary Sachs.* The *arluk* had got too far off shore and been caught in the ice and carried way. But though there still were two ships safe, they contained very ittle of the special equipment commonly used in Arctic exploration, for it ad been the task of the *Alaska* from the beginning only to work on the ainland coast of America, and the *Mary Sachs* had been intended as a ender to wait on whoever needed her services and to do oceanographic ork in the comparatively safe waters between Herschel Island and Banks Island. The *Karluk* carried most of our pemmican, malted milk, and other ondensed food. The *Mary Sachs* and the *Alaska* had some light sledges, suitable for work on the comparatively level ice inshore, but the *Karluk* had carried all but two of the heavy sledges specially designed for rough ice work.

Through accidents and other circumstances we did not even have the full use of the equipment of the *Alaska* and the *Mary Sachs* and eventually had to do our work of the spring of 1914 with one sledge and six dogs. These were exceptionally good dogs, weighing from 90 to 130 pounds each, and they pulled a load at the start of 244 pounds a dog, which is about double the greatest amount hauled by dogs in previous polar exploration, so far as is known to me. I walked ahead to pick the road through the rough ice, and the other two men did not need to help the dogs except in especially bad places. Where the going was even reasonably good we made 15 to 25 miles per day, although in places where a road had to be made by pickaxes over the miniature mountain ranges of broken ice we call "pressure ridges" we made only a hundred or two hundred yards an hour.

No More Need for Dog to Eat Dog

Journeys over the sea ice before ours had been conducted on the theory that the Arctic is a barren and desolate waste where, because of absence of local resources, you must carry with you all the food you are going to eat and all the fuel you expect to burn. For that reason Nansen and those who followed him, for what they considered to be the stern necessity of polar exploration, not only carefully calculated every ounce of food but, as the sledges were emptied of provisions, killed the dogs one by one and fed them to the other dogs. Peary never planned to kill dogs to feed to other dogs, but he kept them, as well as his men, upon rigorous rations, for he expected no replenishment of his stock, and it was necessary to be mathematically exact in adjusting food and fuel to the proposed length of the journey. Under this system, he tells us in his book "The North Pole," he expected to lose sixty per cent of his dogs. Many would probably be killed in fighting among themselves, as the dogs were numerous and were never tied at night. Others probably would be lost through the thoughtless cruelty of his Eskimos, and a dog that becomes lean either through excessively hard work or because of limited rations is very likely to freeze to death on an especially cold night.

Adapting to the Environment, Our Policy

But we based our exploration on a fundamental assumption differing diametrically from that of our predecessors. Where they postulated a dearth of all food and fuel and an environment at every point hostile to man, we assumed an environment friendly if you adapt yourself to it, instead of fighting it, and we expected to find waiting for us wherever we went an abundance of food and fuel which merely required for its finding an "icecraft" corresponding to the woodcraft of Boone or the plainscraft of Carson. This we considered we had acquired in five years of proving all things that the Eskimos know and do and of holding fast that which was good. On this theory we needed to carry no food or fuel with us, but merely the equipment for securing them, and so we needed not ten- or twenty-dog sleds like previous expeditions but one sled only and six dogs. We could not afford to lose, however, even one of those six dogs. Furthermore, when a dog has worked faithfully for you for months or years you become so fond of him that to lose him is like losing a friend. For these

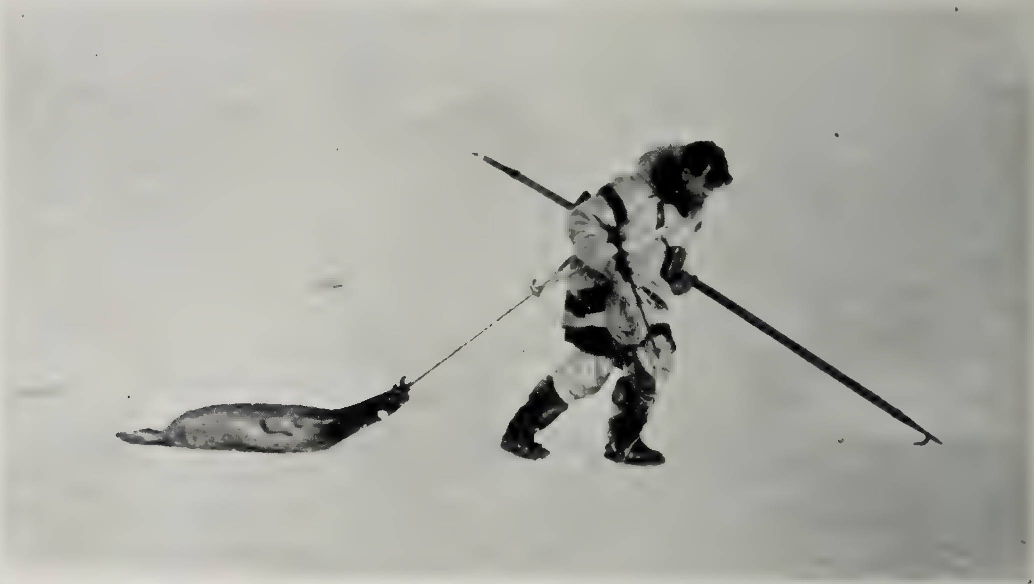


Fig. 6—The author hauling a seal "ashore" that has been shot in the open water. If near enough, the dead seal is secured by means of a line to which is attached a ball of wood with recurved hooks on three sides. The ball is thrown beyond the seal and pulled in gradually until one of the hooks catches in the carcass, which can then easily be brought up to the edge of the ice.

reasons we were very careful of our dogs, tied them every night to prevent fighting, and were nearly always able to feed them so well that in spite of hard work they were continually fat. In our five years there were two or three occasions when, through a combination of hard work, extremely cold weather, and temporary shortage of game, the dogs became lean through short rations, although they never actually had to go without a meal. But even when this happened it was only a few weeks till, through generous feeding, they had become fat again.

Abundance of Seals

At sea we found no diminution in seal life even as we went farther from land. The number of seals varies in different parts of the ocean, but this depends apparently neither on latitude nor on distance from shore but on the mobility of the ice. Wherever there are strong currents and the ice breaks easily, as north of Alaska, for instance in latitude 73° or 74° N., seals are abundant though it is far from shore. But in the region northwest of our new islands and northwest of Ellef Ringnes Island the ice is extraordinarily sluggish in movement and consequently very thick. Wherever there is much open water in the summer there will be many seals the following winter; but in this region there is very little open water in the summer, and a scarcity of seals is to be expected. Still, in the spring of 1916 we found enough seals for our needs and more seals the farther north we went, showing clearly that the high latitude was not to be blamed for the scarcity.

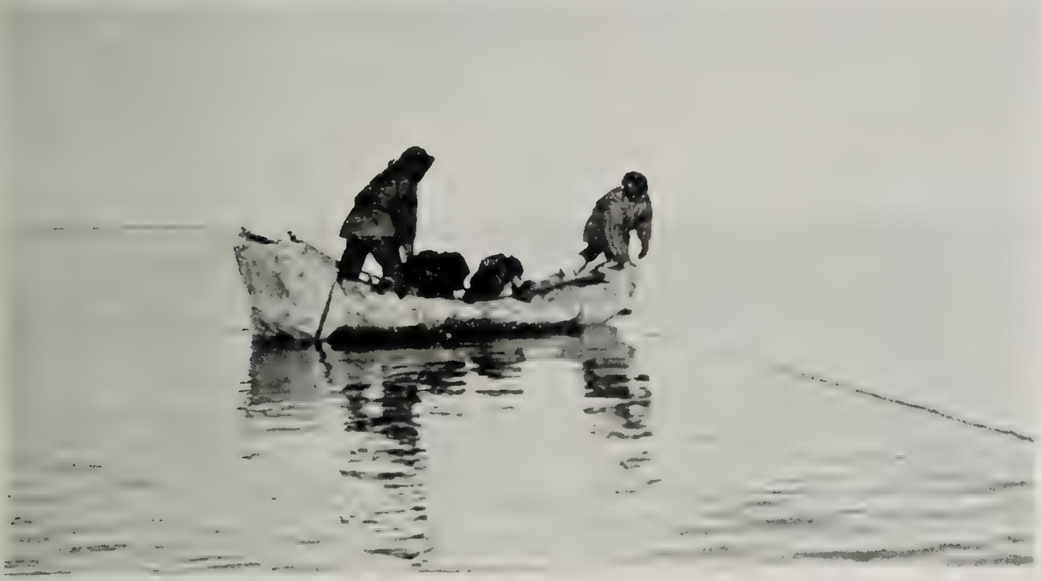


FIG. 7—Boat used in securing a seal that has been shot in the open water when the carcass is beyond the reach of the line described in Figure 6. This boat is made by lashing a 40-pound waterproof tarpaulin around a sled. The tarpaulin, when rolled up, takes up no more space than a bolt of cloth in a store; yet such a boat can carry a thousand pounds. This device has made it possible for the author easily to cross open leads—heretofore an insurmountable obstacle in sledging over sea ice.

Sealing Through Breathing Holes

There are three main ways of getting seals, depending on the environment in which they are found. In the fall when the open water in which the seal finds himself begins to freeze over he will break the mush ice for breathing purposes, until it gets to be about two or three inches thick, by butting his head against it. After that he keeps the breathing hole open by gnawing. Fortunately for him his teeth, although they are of the carnivorous type, are located somewhat like those of a rodent. As the ice becomes a foot or two feet or even five or six feet thick, the seal's hole assumes a cigar shape, with a breathing opening at the top two or three inches in diameter. Commonly a seal has half a dozen of these breathing openings within an area as large as two or three city blocks. All of them are adequately concealed from man by a snow covering, whether there be two inches of it or two feet; but the odor of seal penetrates the snow above the holes, so that they are readily discoverable to the keen scent of a dog. When a dog team stops to sniff something it is probably a seal hole, for there are few other things on the polar ice that have a smell.

The location of the hole once roughly determined by the dog, the hunter scrapes away the snow until he is so near the water that he begins to see black through the thinning snow. The hole must not be completely uncovered, for then the seal, rising toward it, will notice the increased daylight and go to another hole. When the snow covering has been made thin enough the hunter takes a slender stick or ivory rod, about the size of the knitting needles so frequently seen of late years, and sticks it through the snow into the water of the breathing hole to the depth of two or three inches. When the seal rises to breathe, his nose strikes the ivory rod and pushes it up. As the rod rises the harpoon of the hunter descends; and if it hits the breathing hole it hits the seal, for the seal's nose is in the hole. Once fast to the harpoon the seal is easily held, and with the ice chisel the hunter enlarges the aperture until he can pull the animal out.

If the sea were covered with one continuous expanse of ice this would be the only available method of seal hunting, and it is the only one in the winter time on the land-fast ice between the islands of the Canadian archipelago. On the ocean north of Alaska, however, there is no unbroken expanse of ice, but instead an indefinite number of cakes of ice in continual flux. Under the stress of winds and currents these cakes press against each other, and their edges are crushed up into ridges; but even then the pressure is unequal, so that the ice cakes spin around on their axes, opening triangular and pentagonal holes. If the wind is blowing from the land, the strain on the ice separates it into pieces, and wide lanes of water appear between them. These are the "leads" which so obstruct polar travel and are an unmitigated evil to those who employ the "condensed food system" of exploration. But to us they are in a sense welcome, for in the water of these leads we get most of our food.

HUNTING SEALS IN OPEN WATER

The method of sealing through breathing holes is not difficult but is tedious, for the seal may rise day after day in some other hole than the one you are watching. We much prefer to get them in the open water and nearly always adopt this method. There are seals, generally speaking, everywhere in the Arctic Ocean, but their number differs from place to place and in the same place varies from day to day and season to season. So far as we can judge, the seals that are in open water are continually migrating, although those that find their breathing holes located at a great distance from open water are tied to that vicinity for months or for a whole winter. In the ocean traversed by us ice cakes more than twenty or thirty miles in diameter are exceedingly rare, and open water is seen every day or every other day. At times we travel by crossing from one cake to another, where the corners touch, and perhaps for days at a time are seldom or never out of sight of water. Too much water is a disadvantage from a sealing point of view. The ideal is a long, narrow crack, say twenty to one hundred yards wide, opening through ice of this year's formation. A crack running through old ice is not nearly so likely to be well supplied with seals, for the obvious reason that the old ice contains no breathing holes; but let a crack open through new ice, and the seals that are at breathing holes in the vicinity promptly leave them and swarm to the open water.

We aim to camp near one of these places of open water, and, while the men are building the snow house or pitching the tent, according to the season, and doing the other camp chores, I commonly sit beside the water watching for a seal. They may be as numerous as ducks in a pond, in which case one is shot through the head within a few minutes. If he is within twenty or thirty yards, getting him "ashore" is a simple matter. We carry a retrieving arrangement consisting of a ball of wood about the size of a grapefruit, with recurved hooks on three sides. This knob of wood is attached to a cod line three or four times as long as a cowboy's lariat. The line is held coiled in the left hand while the knob is swung above the head with about a fathom of line, in the manner of the bolas. It can then be thrown two or three times as far as the ordinary lariat. It should be thrown directly over the seal where he is floating horizontally in the water. If shot through the head nine out of ten seals will float, but if shot through the lungs about half of them will sink when the water penetrates the lung cavity. The ball that has been thrown beyond the seal is pulled in hand over hand, and when it is about to slide over his back a slight jerk is given it, one of the hooks catches in the carcass, and the animal is easily pulled to the ice where you are standing. If the seal is too far away to be reached in this manner, we get him by boat. The "boat" is our sled, converted to water use by means of a waterproo canvas tarpaulin spread underneath it and lashed up on the sides.

Stalking Seals on the Ice

Some of our ice journeys have extended well into the summer. At that season the seals are commonly found basking in the sun on top of the ice. If the ice is rough they are easily approached and shot from behind cover, but more commonly they are found on an expanse of level ice where it is impossible to get near enough to shoot them without their seeing the hunter first. They lie on a slippery incline beside their holes or beside a lead of water and if alarmed by anything instantly dive.

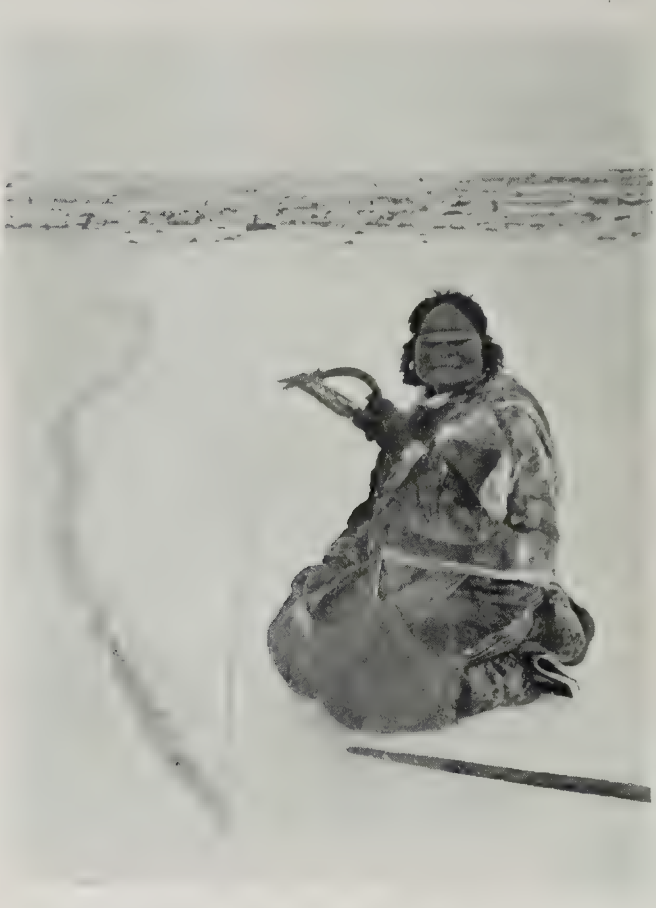


Fig. 8—Eskimo woman fishing through the sea ice. The woman is wearing the native snow goggles, made of a piece of wood with two narrow slits for the eyes, to protect against snow blindness. (See also the man on the right in Figure 1, who has pushed his goggles up above his eyes.)

Under this condition we use another Eskimo method of hunting, the basis of which is not concealment but deception. Since the seal is bound to see you, you must convince him that you are something from which he has nothing to fear. You therefore convince him that you are another seal. This is fortunately easy, because a man lying flat on the ice and seen in a broadside view looks very much like a seal, if he is dressed in dark clothing. To dress in white, so as to conform to the whiteness of the ice, would be a mistake, for the seal's mind is continually centered on his one enemy, the polar bear, so that if he sees anything which is suspicious and white he takes it for a bear and instantly slides into his hole. If, however, he sees something that is suspicious and black, he makes the provisional assumption that it is a seal come out like himself from a hole or a crack to bask in the sun. The eyesight of the northern mammals is not so keen as that of man. The wolf has the best eyes of them all but cannot see you at more than half a mile. The caribou can see you at a little more than a quarter of a mile, and the seal can see you at about three hundred yards. When you get as close as that you must begin to crawl seal-fashion, which is practically snake-fashion. You must not advance head on, for in that position a man does not look particularly like a seal; you must present a broadside view.

Although we spoke of seals as sleeping on top of the ice, the hunter must realize that their sleep is very different from that of ordinary animals. It is continually disturbed by apprehensions of the polar bear. After a doze of half or three-quarters of a minute or possibly a minute and a half, the seal wakes up, lifts his head about twelve or fifteen inches above the ice, and makes a complete survey of the horizon. This takes him eight or ten seconds if he sees nothing suspicious, and he drops asleep for another short nap. During the sleeping periods you advance and during the waking periods you lie motionless. Eventually the seal will see you, at one hundred and fifty to two hundred and fifty yards according to the light.

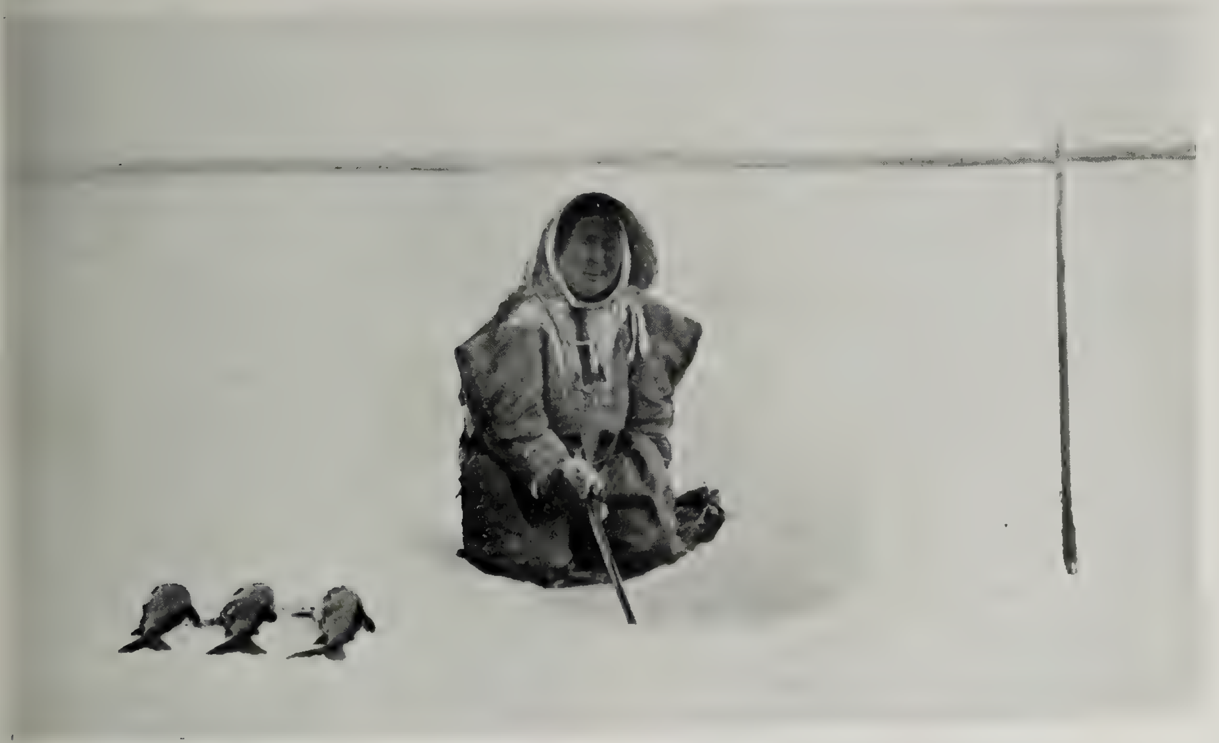


FIG. 9—Eskimo woman fishing through a hole in lake ice.

When he sees you his actions are unmistakable. His body becomes visibly tense, and he raises his head two or three inches higher than before. After one look to make sure that he really does see something suspicious, he moves six inches or a foot or two, so as to be on the very brink of his hole ready for an instant dive. He then watches you intently. If you continue to lie motionless, he becomes suspicious and in a minute and a half or two minutes he will have made up his mind you are not a seal and will dive into the water. When he has been watching you for half a minute or so, it is necessary for you to do something to convince him that you really are a seal. The most elementary thing is to raise your head and go through the motion of looking around for six or eight seconds, and then drop it on the ice again as if you were going to sleep.

When this procedure has been repeated three or four or half a dozen times, at intervals of half or three-quarters of a minute, the seal will be convinced and will resume his naps. After that you advance while he sleeps and lie motionless while he is awake and, whenever he watches you too long, you lift your head and roll around and do other seal-like things.

I have found by trial that my sight is keener than that of a seal by about three to one, and the analytical powers of my mind appear to be keener than his by even a greater ratio. Or perhaps he would prefer to have me say that he is an animal of unshakable convictions. Certainly few men are harder to change from a preconceived belief than is a seal from the once-formed opinion that you are one of his own kind. If merely reasonable care is exercised you can, as an Eskimo can, crawl near enough to seize him by a flipper while you stab him with a knife. Eskimos, however, never do this except as a ''stunt'' or in the rare case of having lost a harpoon. They commonly harpoon seals at twenty to thirty feet distance, though we shoot them from a distance of fifty to seventy-five yards. Were you to aim for the heart, a killing shot could be secured at a much greater distance; but in the case of a body wound a slight quiver may slide the seal's body down the ice incline into his hole. Even without a quiver the blood may lubricate the ice on which he lies enough to slide him forward into the water by the mere force of gravity. But in the case of a brain shot there is not only no quiver but the blood from the wound flows directly into the water without getting under the seal's body.

THE POLAR BEAR AS A SOURCE OF FOOD

At sea seals give us from seventy-five per cent of our food, as in the waters north of Alaska, to one hundred per cent, as in the area west and north of Prince Patrick Island. When there is another food animal it is the polar bear. In the vicinity of land bears have to be hunted, for there they are afraid of men, dogs, and wolves; but on the ice of the high seas one cannot properly speak of hunting them. They hunt you, or at least they come voluntarily into camp either by following yesterday's sled trail and arriving during the night or by getting the wind of your camp while passing at a distance of anything less than ten miles to leeward, in which case they come up the wind. On land I have seen polar bears pass to leeward of a cache of caribou meat without paying any attention. Undoubtedly they must be able to sniff the odor, but it apparently means nothing to them. It is probable therefore that, as the smell of our camps is completely strange to them, like the smell of venison, they would not trouble to pay us a visit if there were not always about the camp a smell of seal meat, which to the bear is both well known and attractive. It seems a reasonable assumption that bears can easily tell the difference between the smell of a live seal and that of a dead one.

Certainly they act when approaching our camps as if they expected to find a dead seal. They come walking at a steady gait as if not expecting the dead seal to try to elude them, and they come without concealment, for they do not expect a dead animal to be on its guard.

THE ARCTIC FOX AND THE SEA GULL, HIS PARASITES

At sea polar bears are familiar with two animals besides the seal, both of them so elusive that he cannot catch them and never tries, and both so small and timid that he expects no harm from them. These are the white Arctic fox and the sea gull. It is not generally realized that the Arctic fox is almost as much a sea animal as the polar bear. In summer the foxes are on shore living in affluence chiefly on lemmings and birds' eggs. Perhaps ten per cent remain on shore in winter also, picking up a precarious living, but most of them spend the winter at sea. Here they are unable to provide themselves with food, for they are too puny for killing seals and they lack the skill for fishing. They are therefore by necessity parasites on the polar bear. Where you see a bear track you commonly see from one to six fox tracks following. When the bear kills a seal he usually gets an animal weighing a hundred and fifty pounds or more. His idea of a square meal is fifty or sixty pounds of meat and

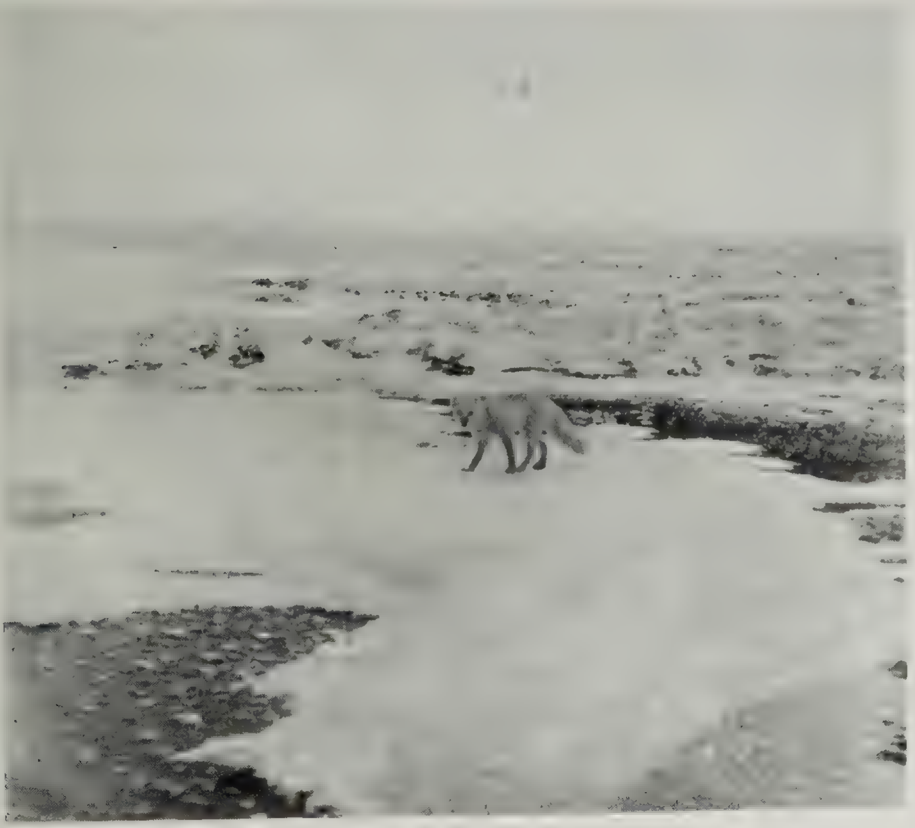


FIG. 10—A white Arctic fox on sea ice. It is not generally realized that the Arctic fox is almost as much a sea animal as the polar bear. Although the foxes are on shore in summer, living on lemmings and birds' eggs, most of them spend the winter at sea, living as parasites on the polar bear, on the remains of seals that he has killed.

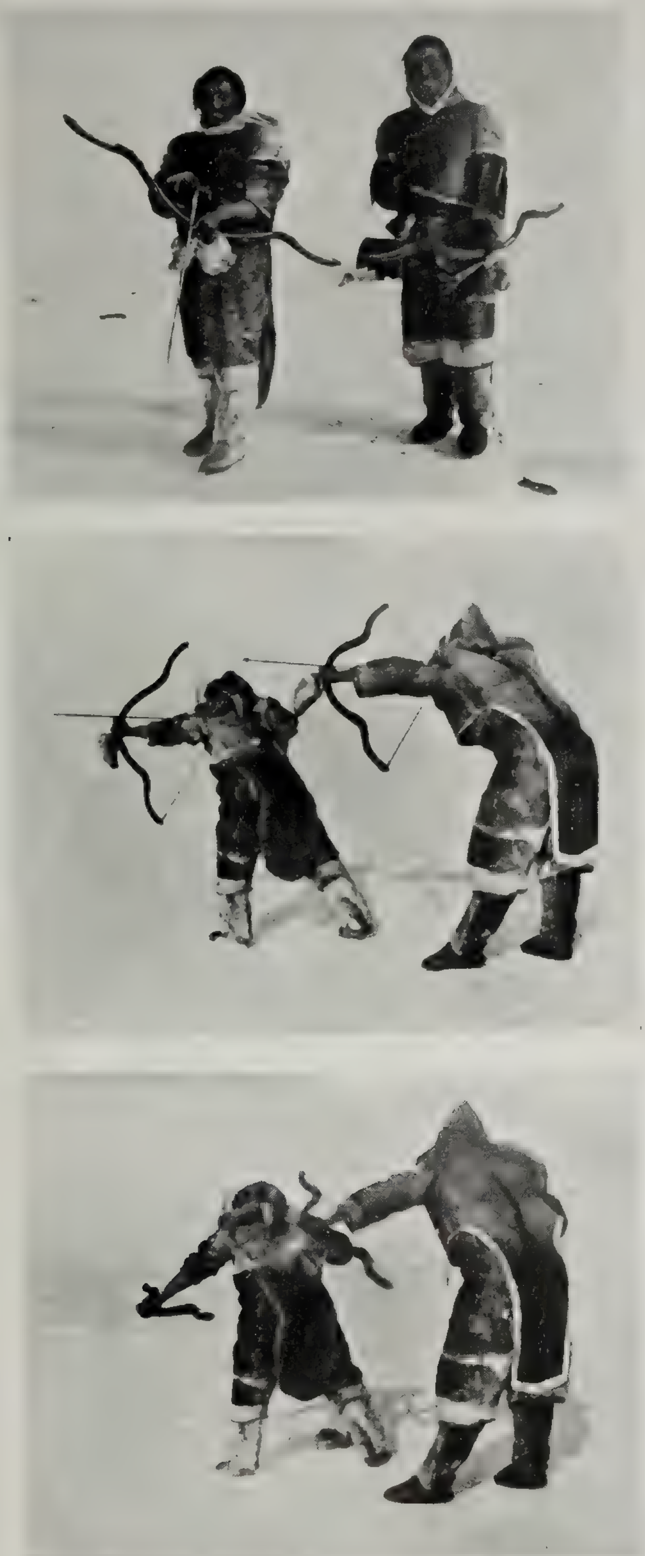
blubber, chiefly blubber; for we find every now and then the bodies of seals with half the blubber eaten, along with the skin that covers that part, and with all the meat still remaining. When the bear has eaten his fill he apparently feels as if he should never care to eat again and walks off leaving the foxes in possession. Should he come back to his kill, the foxes would make room for him readily though perhaps not cheerfully, barking a good deal at a safe distance. In winter there are no sea gulls, but in summer gulls are always hovering about a seal kill, though they flutter away on the approach of a bear.

Because the bear knows no animals at sea except the seals upon which he feeds and the foxes and the gulls which make way for him, he seems to identify any living thing he meets with one or the other of these animals. His identification of a man lying flat on the ice or of a sleeping dog will be with a seal, but if he sees a man standing upright and moving about, or a dog jumping and barking where he is tied, he identifies them with foxes or gulls—noisy but harmless and uninteresting animals.

Visits in Camp from Polar Bears

When a bear approaches camp his tactics depend on what he sees first. If it is a dark dog sleeping he may pay no attention to him at all, mistaking him for the dead seal he expects to find; but if he sees the dog lift his head or otherwise move slightly, he takes him for a live seal and instantly drops flat on the ice and begins to approach with all the art and craft of the seal hunt. If there are ice hummocks about he gets in line with one so as to hide his approach. If the ice is level he slides forward snake-fashion or toboggan-fashion while the dogs are, as he believes, sleeping; but if one of them moves he stops motionless and doesn't stir till everything is quiet again. What he is trying to do is to get within twenty or thirty yards of what he takes to be the sleeping seal. He will then make a dash, slower perhaps than the charge of a lion, but surely not much slower, for the rush of a bear is unbelievably swift for so sluggish-looking an animal. If the bear ever got near enough to begin his dash before the dog saw him, the dog would be killed before he realized that a bear was coming and before the bear realized the dog was not a seal.

We have always been in fear of having a dog killed in this way. To protect them from each other we have to tie them. Hard-worked dogs on small rations have not the spirit for much fighting, but ours are commonly so well fed that they are always spoiling for a fight. One of the six could at any time be crippled if not killed in the minute between the start of a fight and the arrival on the scene of one of us, awakened from a sound sleep by the racket. To protect them from bears we tie them, since we must tie them anyway, to windward of the camp so that a bear coming up the wind will have to pass camp first. We commonly have plenty of meat, and for additional protection we scatter several pieces of frozen neat to leeward of the camp, hoping that the bear will find one and start ating it, making enough noise to waken one of the dogs. By these pre-



FIGS. 11-13—Eskimo bowmen of Coronation Gulf; three views to illustrate the use of the bow. The bows are made each of three pieces of wood and have the three-curve Tatar shape. Their extreme range is 100 yards; effective range, 75 yards. The arrows have heads of stone or beaten native copper.

cautions and through exceptional good fortune it has happened with us that a man or a dog has always seen an approaching bear before he made his final dash.

The moment a dog sees a bear he starts barking, and in a second ever other dog is barking. At that moment the bear loses all interest. H apparently thinks that after all they are not seals but foxes. As he stil smells the seal meat he reverts to his former opinion that there is awaitin him a seal carcass around which a number of foxes have gathered, and h gets up and resumes his quiet walk into camp, glancing now and the with little interest and no hostility at either a dog or a man that he see moving about. It is the nature of the beast to glance over his shoulde from side to side as he walks and to expose alternately one side or th other to anyone who is in the direct line of his advance. The approac of a bear to camp is with us a commonplace and causes no excitement. A second man may stand by in case of misadventure while the first waits with rifle ready till one side or the other of the bear is exposed, and then a bullet near the heart ends the story.

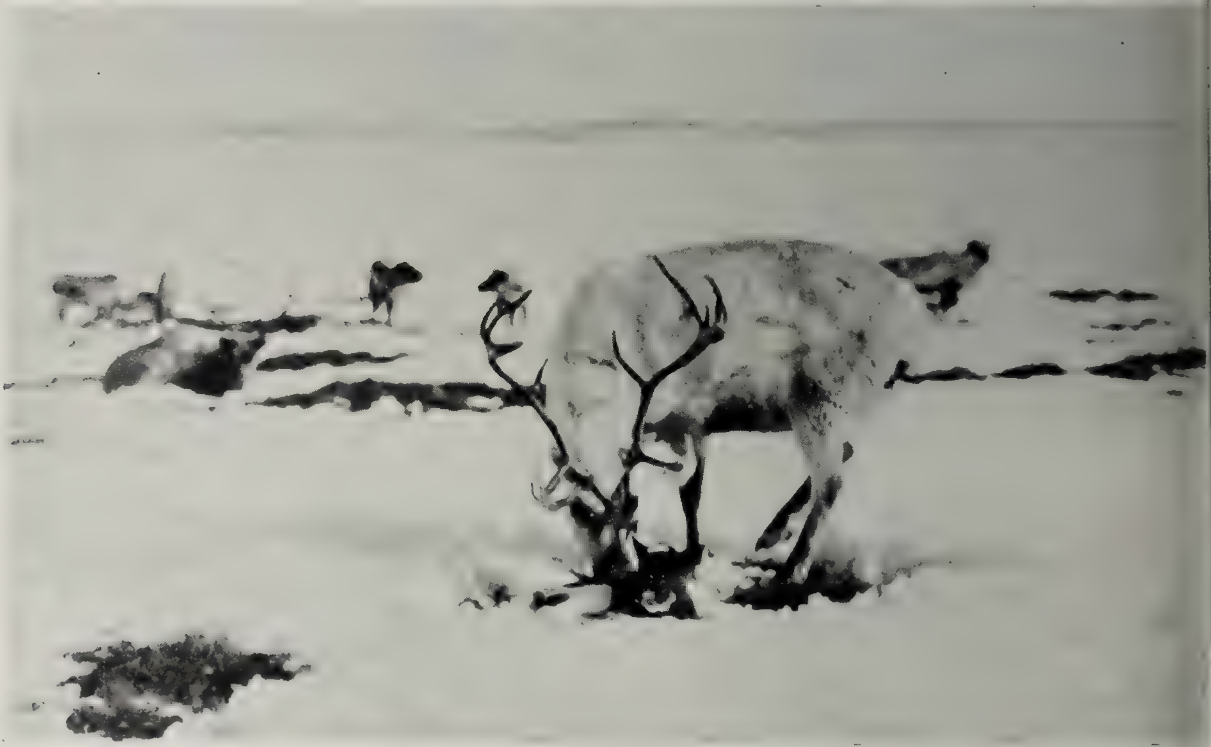


FIG. 14—Caribou feeding on the lichen under the snow cover of the tundra. (See also the views of migrating caribou, in the *Geogr. Rev.*, Vol. 2, 1916, pp. 58-59.)

ECONOMIC USE OF AMMUNITION

Safety as well as success in exploratory parties such as ours depend so largely on rifles that we naturally use those we think are the best. Our 6.5 millimeter rifle is said to have a muzzle velocity of 3,160 feet per second, and, though the cartridges are so light that there are more than thirty to the pound, we have found this so efficient a weapon that if more than one bullet is needed to kill the largest North American animal it is not the fault of the rifle but of the man that holds it. By careful shooting and by never shooting anything smaller than a wolf we have been able to average 125 pounds of meat, live weight, for each cartridge.

This means that we get over two tons of food for a pound of ammunition, which is another way of saying that, from the point of view of transportation, ammunition is several thousand times as economical as pemmican or any other form of condensed food.

PRACTICABILITY OF LIVING OFF THE COUNTRY

There may be areas of the polar sea where no food animals are found; but this seems to me unlikely, for the same arguments were advanced against the foodlessness of the areas we have explored as are still available for the foodlessness of those as yet unvisited. It is at any rate certain that if there are any foodless sections of the Arctic Ocean they are foodless not because of their latitude but because of the immobility of the ice and the consequent inability of seals to find breathing spaces.

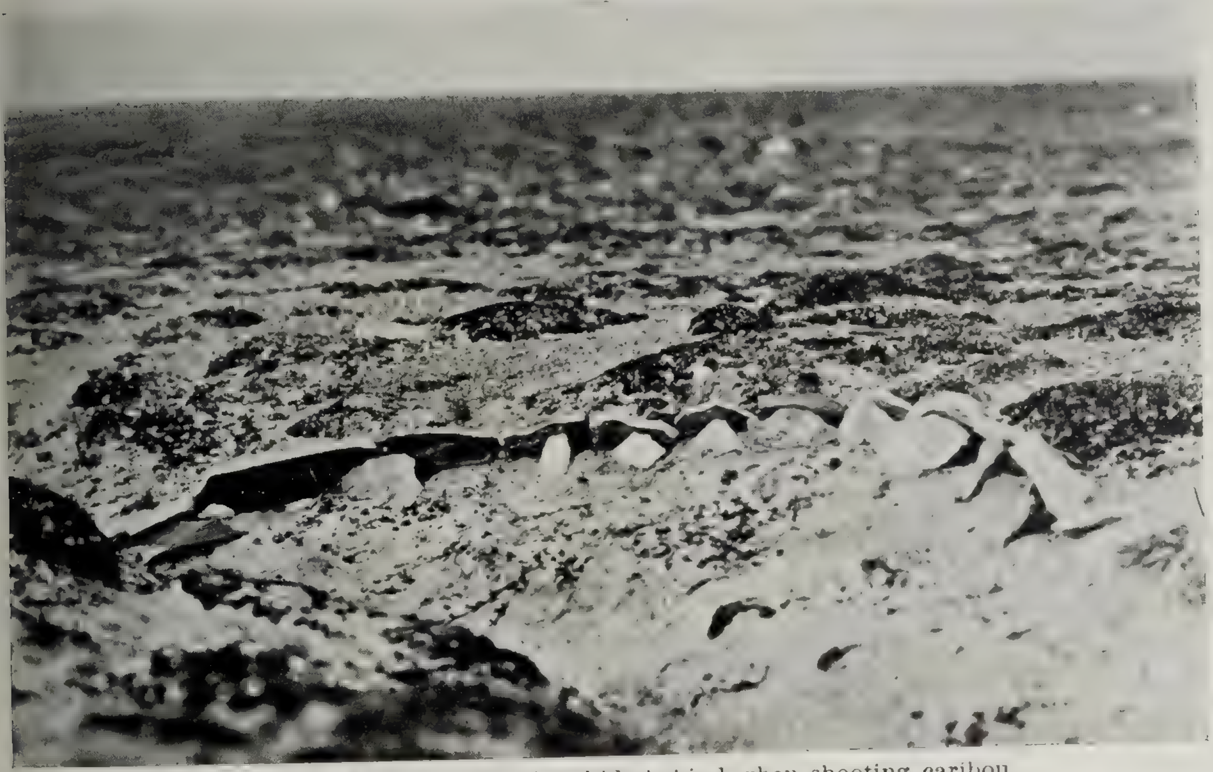


FIG. 15—An Eskimo "blind" to hide behind when shooting caribou.

By the system of "living off the country" an exploratory journey of several years can be made, with the one modification that it is necessary to stop somewhere and accumulate during the daylight of autumn enough food and fuel to last through the darkness of winter. We are sure that this can be done at sea, and no one who has accompanied me on any of our sea trips doubts that wintering on the moving ice would be safe so far as food is concerned. At least there would be no trouble about putting up enough meat and blubber in the summer; the only element of danger would be that should the ice cake upon which the food is stored happen to break up during the winter, some of the food might be lost by spilling into the water. This would be a real danger, but it could be guarded against in a measure by not trusting all the eggs to one basket, but making caches of food and fuel in perhaps half a dozen places through an are the size of a city block.

That one can safely live through the winter on an uninhabited islan we demonstrated in 1916-1917. In the spring and summer of 1916, whil three of us were making an exploratory journey of eight months' duration a party of fourteen, consisting of three Eskimo families and some whit men under command of Storker Storkersen, were hunting in Melvill Island. They dried for sledge provisions for the coming spring the mea of thirty seals and over ninety musk oxen and secured enough skins fo the women to make into clothing for winter use, and tallow and blubbe enough for fuel. It happened that they found several good coal mines, and, as we had some galvanized iron cans which could be converted int stoves, we burned coal in large houses made of musk-ox skin, while otherwise we should have burned seal oil in smaller snow houses lined with skins.

Caribou Hunting

The hunting of caribou is simpler than that of seals. They are not hard to find, for with our good binoculars we can see them at distances of five to ten miles; they are not hard to hit, for they are bigger than seals and our rifles have a trajectory practically flat up to three hundred yards; it can hardly be supposed we lack skill in hunting after having lived by our rifles in the Arctic the larger part of ten years. I have accordingly long since ceased considering that (where game is scarce) there is any appreciable chance of failure in getting whatever caribou may be in a given section, or at least seventy-five per cent of them. It may take five or more hours to approach within sure shooting distance of a band after you first get within half a mile of them, but unless they are frightened through some accident, such as a sudden change of wind or the appearance of a wolf that stampedes them, the hunter should secure the entire band and commonly enough does so if the number is not over ten and occasionally even when there are over twenty.

Musk Oxen

With musk oxen one can scarcely speak of hunting methods at all. If you have a dog with you and set him on the herd, they will stand in a defensive circle while you kill the entire band. If you are alone, there is no trouble in approaching near enough to kill several from behind cover. Two or three men together can run up to a herd which will stand on the defensive against them just as it would against dogs, provided only the men run at top speed and take their positions around them at a distance of five or ten yards. We had two hunting camps in Melville Island. At the southern one this method was never used, but at the northern one the men discovered it late in the hunting season and used it in killing three or four of the last bands. The method of using dogs is an ancient one known both to the Eskimos and the Indians.

SPITSBERGEN, *TERRA NULLIUS*

By R. N. RUDMOSE BROWN
Sheffield University

The archipelago of Spitsbergen lies about 400 miles north of Norway, xtending to within 600 miles of the North Pole. It consists of two large nd many small islands and has a total area of about 25,000 square miles, hat is to say about twice the area of Hawaii. Bear Island, about 130 niles south-southeast of Spitsbergen, has an area of 70 square miles. Spitsbergen, with Bear Island, holds an almost unique position today in being a *terra nullius,* one of the last remaining territories on the face of the globe to be unclaimed by any state.

Discovery by the Dutch

It was the search for a route to the Spice Islands and the riches of Cathay independent of Portuguese control that led to the discovery of Spitsbergen. Towards the end of the sixteenth century the Company of Merchant Adventurers of London, generally known as the Muscovy, or Russia, Company, sent forth ships to seek a northeast passage. Sir John Willoughby and Richard Chancellor discovered Novaya Zemlya, or at least revealed it to western Europe, and opened up a rich trade with the White Sea. The Dutch, strenuous rivals of the English, were soon on the scene pushing northward to share the Arctic trade and hoping to forestall the English in the discovery of a route to the East. It was in 1596 that two Dutch navigators, Willem Barents and Jan Cornelis Rijp, found Bear Island and gave it its present name. Pushing farther northward the small ships encountered some difficulty with ice but ultimately, in a high latitude, were able to bear eastward and on June 17 discovered a lofty snowy land which from the appearance of its sharp peaks they called Spitsbergen. The name is therefore Dutch, and there is no excuse for adopting the German version with a medial ‘‘z’’. The two Dutch ships mapped the northwest corner of the land, erected the Dutch arms either at Cloven Cliff or at Vogelsang, and sailed south along the west coast, noting several fine bays. Reaching Bear Island once more the two ships parted company. Barents sailed eastward and ultimately wintered in Novaya Zemlya. Next summer he perished in an open boat on the way to the mainland. Rijp on parting from Barents returned to Spitsbergen, but his visit was barren of results. There is no foundation whatever for the story that he circumnavigated Spitsbergen or even visited the east coast.

Possible Earlier Discoverers

There is some evidence that the Dutch were not the first to visit Spitsbergen and that the country had already been known for several centuries and forgotten. It would indeed be strange if roving Norsemen ha never crossed the few hundred miles of sea between Norway or Icelan and Spitsbergen. Definite proof, however, is hard to find. The Icelandi annals of the fourteenth century record that Svalbard was discovered i 1194, and the "Landnamabok," published early in the thirteenth centur says that "from Langanes on the north side of Iceland it is four *doeg* sea to Svalbard on the north of Hafsbotn." What land was Svalbard The name means cold side or coast and so clearly refers to an Arctic land Hafsbotn was the ocean to the north of Norway. Due north of Langane there is no land, but the directions in the Landnamabok must be liberall interpreted. Four days' sail to the northeast would be about 400 to 85 miles' distance, depending on the strength of the winds. Spitsbergen i only 840 miles from Langanes, so that it is quite probable that Svalbar was really Spitsbergen.[1] It is possible that, having discovered Spitsbergen the Norsemen visited it to hunt walrus, seals, and bears. There are legend existent that suggest that this was the case, but nothing definite is o record.

Not only Norwegians but also Russians may have forestalled the Dutc in Spitsbergen. Early in the sixteenth century, if not before, Russian from the White Sea and Murman Coast hunted in the Polar seas. They frequented a land which they called Grumant. This possibly was Spitsbergen but may have been Novaya Zemlya. In all probability it was not the land now known as Greenland. Modern Russians frequently use the name Greenland for Spitsbergen, with which it has become traditionally associated. Although it is difficult to trace the legend to its origin, it is generally believed in northern Russia that Spitsbergen was known many centuries ago. Of course it is possible that these traditions date merely from the Russian trappers of the eighteenth century and do not antedate the voyage of Barents.

The Whalers

The discovery of Spitsbergen had no immediate result. Barents had many comments to make on the country, but he failed to notice its resources in oil, fur, and ivory. No ship visited its shore till the English navigator Henry Hudson in 1607 made the discovery of whales and walrus in Spitsbergen waters. A few years later the Muscovy Company, acting on this information, began the important whaling industry which for many years was to make Spitsbergen one of the most talked-of places in western Europe. England therefore was the first nation, with the possible exception of Russia, to make use of Spitsbergen. It is perhaps more correct to speak of early walrus hunters than of whalers, for it was some few years before whaling was regularly pursued. The species hunted was the northern right whale (*Balaena mysticetus*), chiefly valuable on account

---

[1] For a full discussion of this problem see Fridtjof Nansen: In Northern Mists (2 vols., New York, 1911), Vol. 2, pp. 165-173.

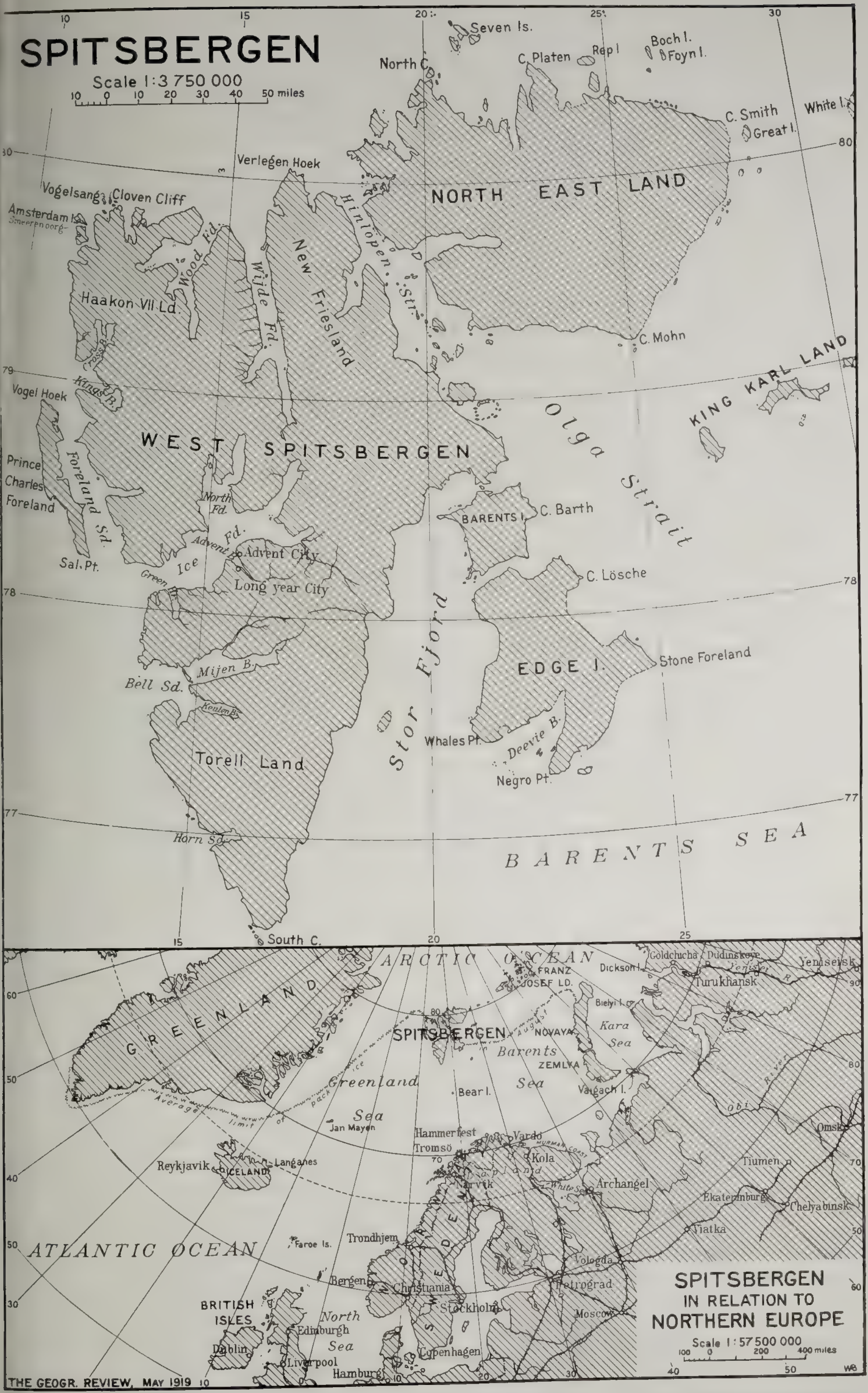


FIG. 1—Sketch map of Spitsbergen, 1:3,750,000. On the inset below, the average limit of pack ice in August is shown according to the map for that month in "The State of the Ice in the Arctic Seas: Summary, Average Limits, etc." Danish Meteorological Institute, Copenhagen, 1917.

of its whalebone, which was the main object of the hunt. English whale were quickly followed by Dutch and Danish ships. A few Basque whaler whom the English at first employed to teach them the art of harpoonin also came in their own ships. The profits of the chase—at first in walru ivory, later in whalebone and oil—were large. In some years several hundred ships frequented the western bays and the Edge Island fishery. Bot the Muscovy Company and the rival Dutch company obtained charter from their respective sovereigns granting each a monopoly of the fisher and to add to the confusion the Danes maintained that neither compan had any right to visit Spitsbergen without Denmark's permission. Th Danish plea was that Spitsbergen, being part of Greenland, was Danis territory. Certainly on its discovery it was supposed to be part of Greenland, and the name was frequently applied to it throughout the whalin days; but the Muscovy Company's skippers after a very few years decide that it was an island. The Danes probably held the same belief but fai clung to the Greenland theory in the hope of maintaining a tribute fron the whalers. Disputes were numerous, fights often occurred, the whalers were frequently accompanied by fighting vessels, and there was endless diplomatic correspondence. King James I had claimed the country in 1614 and had authorized Baffin and Fotherby to take possession in his name. This they did, but the annexation was received with indifference by the Dutch and ignored by the Danes. The exciting annals of Spitsbergen at this period have been recorded in detail by Sir Martin Conway, to whose book reference should be made.[2] Eventually the whalers found a *modus vivendi* and pursued their calling more peacefully. They began to erect shore stations at which to boil down the blubber, and this led to the assignment of certain bays to certain nations. Summer settlements grew up, of which the Dutch Smeerenborg on Amsterdam Island was the most important. At the height of its prosperity, about 1640, this blubber town had a summer population of some 2,000, including women. A few men even wintered there, but scurvy generally exacted its toll. At length the whaling failed, by reason of the whales' leaving the bays for the open sea. The Dutch followed and persisted in that policy till the end of the eighteenth century, but the English abandoned Spitsbergen many years earlier.

THE TRAPPERS

The next phase of Spitsbergen life was the era of the fur trappers. When the Russians began this pursuit we do not know, but by 1720 they were already wintering in Spitsbergen and continued to do so for over one hundred years. Fur animals must be trapped in winter, as the skins are of little value at any other season. These trappers came by hundreds and built small rude shanties on every headland along the coast. Here they lived in twos and threes, pursuing their arduous but lucrative calling.

---

[2] Sir Martin Conway: No Man's Land, Cambridge, 1906.

ears, foxes, and reindeer were plentiful, and walrus were not then extinct. he death rate from scurvy was high; every headland has its relics of a ave and a cross. But there was no lack of adventurers for the work. summer the party was relieved, and a new party set down at another ot. One trapper, by name Staratchin, is said to have spent fifteen con- cutive years and a total of thirty-nine years in Spitsbergen, where entually he died in 1826.

The Russian trappers were followed about a century ago by Nor- egians, but it was not till the beginning of the present century that orwegians began to winter there. Their habits were much the same as ose of the Russians. But animals were decreasing in number, and to pplement lawful hunting the Norwegians resorted to poisoned bait. his increased their haul for a few years but virtually exterminated the xes and reindeer on the west coast. Many poisoned beasts crawled into oles to die and were lost to the hunter. So in the end this dastardly ethod was its own undoing. Only in recent years, with the soaring price f furs, has the occupation of fur trapping in Spitsbergen again become rofitable. The hunters have been accused with ample justification of ex- rminating the animal life, but they are not alone to blame. Tourists f all nationalities have wrought wanton destruction in the name of sport. have seen a dozen bodies of reindeer in one short valley, all slaughtered r the insane joy of killing. One of the most necessary reforms in Spits- ergen is stringent game laws in order to preserve what is left of the auna.

Exploration

The Muscovy Company's skippers were frequently of an exploring bent f mind and pushed eastward to see what they could find. The Dutch also id some exploring but were as a rule too keenly interested on the com- ercial side of their venture. English and Dutch names around the coast estify to the work of these early navigators. The chart would be more xplicit in this respect if all the early names had been retained. Many ave been replaced by modern names. The whalers were fond of keeping heir discoveries secret, and so the chart grew but slowly. Sir Martin Con- vay has tried to restore the early names to the modern chart,[3] but it is o be feared that many of the newest names are too firmly established now o be removed. We can at least protest against the Norwegian and wedish habit of rechristening places with Scandinavian names and gnoring the work of earlier explorers. Norwegians were last on the cene among the explorers of Spitsbergen and for their want of initiative hould be content to accept the names which more enterprising explorers ave to the features of the coasts.

The period of the trappers was a dark one in exploration. Illiterate nd caring for little but material gain, they added nothing to the chart of

---

[3] *Op. cit.*, pp. 347-368.

Spitsbergen. But already the period of scientific exploration was dawn ing. Scoresby, the great Arctic navigator, was the forerunner of thi period in 1805. He was followed in a few years' time by several exped tions sent by the British government. The most famous was that of Si Edward Parry in 1827, which did much exploration in the north and north east of the country. But the objective of these expeditions as a rule wa the Pole; Spitsbergen was only a secondary matter. The serious explora tion of Spitsbergen is not a century old, and much still remains to be done It is impossible here to record even the principal expeditions. Suffice t say that the Swedes led the way in geological work. Lovén, Torell, Nor denskiöld, De Geer, Nathorst, and Andersson are a few of the best-know Swedish names; nor must Andrée and his fateful expedition be forgotte British explorers have also done important work: they include B. Leigh Smith, Arnold Pike, Sir Martin Conway, E. J. Garwood, and W. S. Bruce The last, with eight or ten expeditions to his credit, during his long recor as a polar explorer, has visited every coast of Spitsbergen and crossed th country in several directions. It is safe to say that no living man know more of Spitsbergen than Dr. W. S. Bruce. Norwegian explorers with on exception were late in the field, although a Norwegian first circumnavigate Spitsbergen in 1863. Their research efforts have been mainly directed t survey work in the interior in recent years. Other nations have don little in Spitsbergen. The Prince of Monaco, however, deserves mention Several seasons he took north his splendidly equipped oceanographica yacht, *Princesse Alice,* and conducted valuable hydrographical surveys. He was also very helpful to both British and Norwegian expeditions o many occasions. Finally the joint Russian and Swedish expedition of 189 to 1902 may be noticed.[5] The object was to measure an arc of meridia in a high latitude. For this purpose the Swedes wintered in the north an the Russians in the south of Spitsbergen. In the course of several sum mers the two parties joined their trigonometrical network along the eas of the country. Unfortunately the detailed maps of this expedition ar not yet available.

Cartography

The British Admiralty chart of Spitsbergen[6] is the only large-scale map of the whole country. Successive editions show considerable changes even on the west coast. The east coast is still rather vague and sketchy and probably far from accurate in detail. The Swedes have put together use-

---

[4] Exploration du Nord-Ouest du Spitsberg enterprise sous les auspices de S. A. S. le Prince de Monac par la Mission Isachsen: Première Partie, par Gunnar Isachsen, Fascicule 40; Deuxième Partie, par Gunnar Isachsen et Adolf Hoel, Fascicule 41, *Résultats des Campagnes Scientifiques Accomplies . . . . pa Albert Ier . . . de Monaco*, Monaco, 1912 and 1913. Accompanied by a map in 2 sheets, 1:100,000, with relie and glaciers in contours and shading.

[5] See Gerard De Geer: Om gradmätningsnätets framförande öfver södra och mellersta Spetsbergen, *Ymer*, Vol. 20, 1900, pp. 281-302, with map of triangulation net, 1:1,000,000.

[6] No. 2751, mean scale, 1:750,000.

ul maps of Ice Fiord[7] and the northwest coast.[8] But the only maps of pitsbergen which contain any accurate detail of the interior are the Nor-egian state surveys of the western parts of the main island,[9] the work of sachsen,[10] Staxrud, and others, and Dr. W. S. Bruce's large-scale survey f Prince Charles Foreland.[11]

BEGINNING OF MINING

Although coal was discovered in Kings Bay by Poole in 1610 the ining era in Spitsbergen is a quite recent development. From time to ime a little coal was dug for the whalers' use, and now and then in later ears some small vessel gathered enough to take her back to Norway. A ew sloops were even loaded for the Kirkenes iron mines nearly a century go. Europe, however, was slow in investigating the mineral wealth of the islands. Geologists from time to time reported coal seams, but their discoveries were only of interest to scientists. Strangely enough coal was not the mineral which first brought miners to Spitsbergen. In 1872 a Swedish company began to dig phosphates in some curious concretions at Cape Thordsen. A large house was built, and a tramway was constructed to the sea; but the venture was a failure and was abandoned the same year. The house is still standing. Twelve years later it was occupied by a Swedish meteorological expedition which wintered there. Since then it has been from time to time frequented by hunters. The twentieth century had begun before mining was again undertaken in Spitsbergen. In 1904 a Sheffield company acquired an estate in Advent Bay and began operations. A level adit was run into a seam of Jurassic coal outcropping on the hillside not far from the sea. The mine was connected with a small jetty by a gravity tramway. A well-built settlement of log houses, stores, and machine shops, lit by electricity, soon grew up and was grandly styled Advent City. Operations, however, progressed slowly. The coal was not of high quality, and the site of the mine had been unwisely chosen. A few vessels were coaled every summer, till the venture was abandoned in five years' time, before the export stage was reached. Meanwhile important developments had been taking place on the opposite side of Advent Bay, where a thick seam of Tertiary coal crops out. Tertiary coal is not generally looked upon as the equal of coal from older measures. Spitsbergen, however, is a land of contradictions, and its Tertiary coal is not only of better quality than its Carboniferous and Jurassic coal but is equal for steam purposes to Welsh coal.

---

[7] Map of Central Spitzbergen, with the main coal-district, by Gerard De Geer, 1911, 1:300,000, accompanying as Pl. 11, "The Coal Region of Central Spitzbergen," by Gerard De Geer, *Ymer*, Vol. 32, 1912, pp. 335-380.

[8] Map of the North Coast of Spitzbergen, Western Part, constructed mainly from measurements, sketches, and photos of the Swedish arc measurement expedition, 1899-1902, by Gerard De Geer, 1:100,000, accompanying as Pl. 4, "The North Coast of Spitzbergen, Western Part," by Gerard De Geer, *Ymer*, Vol. 33, 1913, pp. 230-277.

[9] Spitsbergen: Farvand og Ankerpladser paa Vest- og Nordkysten, 1:200,000, with seven insets, Norges Geografiske Opmaaling Chart No. 198, Christiania, first edition, 1912.

[10] Gunnar Isachsen: Travaux Topographiques de l'Expédition Isachsen, 1909-1910, *Kristiania Videnskapsselskapets Skrifter: I. Mat. Naturv. Klasse*, 1915, No. 7, with map in 2 sheets, 1:200,000, with relief and glaciers in contours.

[11] Prince Charles Foreland by W. S. Bruce, 1:140,000 Scottish Oceanographical Laboratory, Edinburgh, 1913.

American Mines

The Arctic Coal Company of Boston, Mass., was founded by Messrs. Ayer and Longyear, who purchased estates which a Norwegian company had claimed a few years previously but had not yet developed. In 1906 the Americans began to develop their estate in a thoroughgoing fashion. From an adit into a good seam a wire ropeway was run to a well-built jetty along which large vessels could load in safety. Longyear City grew rapidly and soon became, as indeed it is today, the capital of Spitsbergen. Mining went on all the year round, the winter output of coal being stored for export in summer when navigation opened. By 1912 the annual export had risen to some 40,000 tons. The demand in northern Norway was great, for the coal proved cheaper and was in greater demand than British coal, on which Tromsö, Narvik, and other ports had previously had to depend. Advent Bay in those days presented a busy spectacle in July and August. Half a dozen colliers, a liner or two with tourists, perhaps an exploring ship, and a few hunters' sloops were all at anchor. The American store ship sailed to and from Tromsö and added the Stars and Stripes to the many flags seen among the shipping of the bay. The American estates were extensive and valuable and had been well prospected. In Green Harbor the same company opened more than one adit. The mines attracted much attention for their value; more than one offer to buy was rejected, but trespassers tried to encroach on the estates. Finally, two years after the outbreak of the European War, the Arctic Coal Company sold all its estates to Norwegian buyers and retired from Spitsbergen. While British endeavor discovered coal in Spitsbergen and began mining, it was American enterprise that showed what could be done in the country and led the way in successful commercial development.

Present Conditions

It is not possible within the compass of this article to trace the story of all the mining companies which have fixed their hopes on Spitsbergen. Many, if not most of them, have come to nothing. The success of a few companies drew adventurers and prospectors to the north. In the first decade of this century claim boards were erected every summer along almost every mile of the bays in the vicinity of the coal measures, often in places where no minerals had been reported. Few of the claimants had any geological knowledge; the object was merely to claim a piece of land in the hope that it might be of value. The claims overlapped; claim-jumping was frequent. In most cases the claimants never revisited their land, but in a few instances disputes arose. Such disputes dragged on—

ome are still unsettled—because there is no authority to whom appeal an be made. It became the unwritten law in Spitsbergen that a claim was valid if undisputed and if the estate was not neglected, whether the work accomplished was prospecting, surveying, or actual mining. In order o secure the validity of titles it became customary for claimants to notify heir own foreign office of the extent of their estates. This ensured a record and proof in case of dispute. Out of this period of confusion few serious ventures emerged and stood the test of time. At the outbreak of the war, in addition to the American company already noted, there were two British companies, the Scottish Spitsbergen Syndicate and the Northern Exploration Company, both holding large and valuable estates, and one or two small Norwegian, one Swedish, and one small Russian company.[12] The war curtailed the activities of British companies and indirectly resulted in the sale of the American estates. Scandinavians were left with the field to themselves and took full advantage of the example which more enterprising nations had set. The Swedes developed one of their estates and exported considerable quantities of coal to Norway and Sweden. The Russian company did little. Norwegians, however, were active; but their activity, beyond the purchase of the American coal fields, took the form very largely of trespass on British estates. This has occurred from north to south through the country, and the only excuse offered is the plea of opportunity. In some cases the trespassers have opened valuable coal seams and made good profits for themselves. The scarcity of coal in Norway and its high price during the war were great incentives to these illegal acts. Now that the rightful British owners, however, are preparing to take up again the development of their estates the Scandinavian squatters will have to pack up and depart. As early as August, 1918, a British expedition which visited the Northern Exploration Company's estates made this quite clear.

At the present date the areas of the estates held by companies of different nationalities are roughly as follows: British, 4,000 square miles; Norwegian, 900 square miles (excluding a small estate on Bear Island); Swedish, 350 square miles; and Russian, 100 square miles. These areas comprise only the estates to which the titles are valid and beyond dispute. It may be noted not only that the British claims are by far the largest but that they embrace all the good harbors and contain coal, iron ore, lead ore, asbestos, gypsum, and oil shale. Free oil has also been hinted at; gold and platinum are so far merely dreams.

A State of Anarchy

Despite the high latitude of Spitsbergen, mining is carried on under favorable conditions. The winter is cold but calm. American engineers have compared it favorably with winter in the eastern United States.

---

[12] R. N. Rudmose Brown: Spitsbergen in 1914, *Geogr. Journ.*, Vol. 46, 1915, pp. 10-23.

Miners who spend the winter there like the life and find it healthful. The physician at Longyear City had little to do except in case of accidents Under modern conditions of hygiene and diet there is no fear of scurvy other diseases are unknown. Freedom from governmental control has its advantage in absence of taxes, dues, and harassing regulations, but it has its drawbacks as well. Law and order are maintained only by a show of force; robbers in the shape of Norwegian hunters reap a rich harvest in unguarded mining camps. Property is unsafe from these marauders, who often add to their thefts work of wanton destruction. Numerous specific instances of this are on record. The fast disappearing herds of reindeer are at the mercy of any one with firearms and are slaughtered in the name of sport. Foxes, too, are sadly reduced in numbers.

Under present circumstances it is quite necessary that this lawless state of affairs should be ended. As long as anarchy lasts the efforts of the mining companies are seriously handicapped. Some system of government must be imposed on Spitsbergen, or there promises to be a revival of the local warfare of the whaling days.

POLITICAL STATUS

Several attempts have been made to regulate the political status of Spitsbergen, but so far all have proved abortive. The early Dutch and English annexations have merely historical interest, and the early Danish claim, based on the supposed identity of Spitsbergen with Greenland never had any validity. Russia used to maintain a traditional claim founded on her supposed knowledge of the country before the Dutch discovery, but this claim was never asserted and has no more validity than any other. Norway, strange to say, never laid any claim to sovereignty and indeed failed to show any interest in the country until recent times Enthusiastic Swedish writers have called Spitsbergen a Swedish scientific conquest, but Sweden has put forward no stronger plea. Various international conferences have discussed the matter, and had it not been for mutual jealousy the problem might have been solved some years ago. In June, 1914, a large conference assembled at Christiania. All the nations that had even the remotest claim to an interest in Spitsbergen were represented, but no decision was reached before the adjournment on the outbreak of war. All nations, however, accepted the status of Spitsbergen as a *terra nullius:* this was made the basis of discussion. Thus all claims to previous sovereignty, vague and ill founded as most are, were declared void. The curious political situation which Spitsbergen presents has been discussed by several writers.[13] It is unnecessary to go over the ground again. In some respects the problem has become more complex than it was of old. The enormous development of British interests and the large amount of British work and capital expended in the country give Great Britain an undeniable claim to it. On the other hand, Norwegians point to Norway's state survey, the erection of a wireless telegraph station at great cost, and the institution of a so-called mail service to and from Tromsö. Sovereignty lies between these two countries unless some form of joint control can be devised. In any case it is to be hoped that an equitable settlement will be found at the present peace conference.

---

[13] R. Waultrin: La question de la souveraineté des terres arctiques: La question du Spitsberg, *Revue Gén. de Droit Internatl. Public*, Vol. 15, 1908, pp. 80-125.

Robert Lansing: A Unique International Problem, *Amer. Journ. Internatl. Law*, Vol. 11, 1917, pp. 763-772

A. Raestad: Norges Høihetsret over Spitsbergen i aeldre Tid. Christiania, 1912; French translation by Charles Rabot under title "Le Spitsberg dans l'histoire diplomatique," *La Géographie*, Vol. 25, 1912 pp. 337-354 and 393-412 and Vol. 26, 1912, pp. 65-98.

FUTURE DEVELOPMENT

The future of Spitsbergen depends to some extent on the system of administration it will receive and the success with which it is carried out. It is a country without a native population, and this fact no doubt makes the task of government simpler. Providing nothing is done to discourage pioneers in mining enterprises, there is a great future before the country. The British companies, as already pointed out, have all the most valuable land. Nothing should be done by prejudicial laws and regulations to fetter their activity, or this Arctic treasure house will fail to take its place in the commercial development of Europe. Spitsbergen coal will supply every port of Norway and Russia between Trondhjem and Archangel; it will serve the Scandinavian Lapland railway and the Russian Murman railway. The iron ore, if its body comes up to sample, will be eagerly sought for by the iron foundries of England, Scotland, and other countries of western Europe. No doubt the ore will be reduced on the spot and exported as pig iron. There is no need to dilate on the place the oil will take, if the resources in this direction prove as valuable as is expected. The other minerals, gypsum, asbestos, galena, etc., will find a ready market. In a few years Spitsbergen will have many busy mining camps and a large population throughout the year. In summer the population will be augmented by an influx of tourists and jaded men and women of the great cities seeking health in the invigorating Arctic atmosphere and continual daylight. Luxurious liners will bring these travelers to Spitsbergen; hotels will cater to their wants. Climbing, exploring, boating, and no doubt flying will occupy their time. It is to be hoped that in the interests of the wild life hunting will be prohibited. Spitsbergen bids fair to become not only a great mining country but the grandest playground in Europe.

PIERRE DAVITY: HIS "GEOGRAPHY" AND ITS USE BY MILTON*

By ALLAN H. GILBERT
Cornell University

Milton's Geographical Program

In his tractate ''Of Education'' Milton gives geography an important place in the ideal curriculum. He suggests that early in the training of boys they should ''learn in any modern author the use of the globes and all the maps, first with the old names and then with the new.'' Afterward he would have them read the ancient geographers, Mela, Pliny, and Solinus, until they had ''passed the principles of geography,'' and later they would take up the geographical poet Dionysius Periegetes. Milton also believed in education through travel. ''In those vernal seasons of the year when the air is calm and pleasant,'' and ''it were an injury and sullenness against nature not to go out and see her riches and partake in her rejoicing with heaven and earth,'' he would have his pupils ''ride out in companies with prudent and staid guides to all quarters of the land, learning and observing all places of strength, all commodities of building and of soil, for towns and tillage, harbors and ports for trade, sometimes taking sea as far as to our navy.'' He suggests that at three or four and twenty years of age they may travel into foreign countries ''to enlarge experience and make wise observation.''

In his own teaching Milton carried out at least a part of his program. for his nephew Edward Philips, one of his pupils, tells of reading Pliny and Dionysius and of studying a modern geographer:

> Nor did the time thus studiously employed in conquering the Greek and Latin tongues hinder the attaining to the chief oriental languages . . . besides an introduction into . . . the Italian and French tongues, by reading in Italian Giovan Villani's *History of the Transactions between several petty States of Italy;* and in French a great part of Pierre Davity, the famous geographer of France in his time.[1]

Not only does the sentence give the name of a textbook of geography used by Milton, but it shows that he put into practice the recommendation in ''Of Education'' which here follows:

> If, after some preparatory grounds of speech by their certain forms got into memory, they were led to the praxis thereof in some chosen short book lesson'd thoroughly to them, they might then forthwith proceed to learn the substance of good things and Arts in due order, which would bring the whole language quickly into their power. This I take to be the most rational and most profitable way of learning languages.

---

* For further explanation of many of the matters relating to Milton suggested in the present article the reader is referred to two works by the writer: "A Geographical Dictionary of Milton" (Yale Univ. Press New Haven, 1919) and another volume, still in manuscript, on Milton as a geographer.

[1] Edward Philips: The Life of Milton (in John Milton: "Of Education, Areopagitica, the Commonwealth," Riverside Literature Series, Boston, 1911), pp. lxv-lxvi.

Through Pierre Davity, Milton taught his pupils French and geography at the same time and taught French more effectively by requiring its use as a medium through which to obtain a knowledge of facts important for their own sake, instead of considering the content of the book subordinate to the language.

Yet Milton would scarcely choose a textbook of geography with nothing more to recommend it than that it was written in French suitable for the reading of those learning the language; he must have regarded it also as a good geography. And he was not unprepared to judge, for, as he indicates in the preface of his own little geographical work entitled "Moscovia" (usually called "A Brief History of Moscovia"), he had given attention to the principles of geographical writing. His study of them probably was stimulated by his desire, as a teacher, to find a book adapted to his pupils. Hence he may be supposed to have thought Davity's work the best obtainable. However, since he undertook Moscovia because of his dissatisfaction with the geographers of his day, he must have thought Davity's production far from perfect. Let us see of what sort the work was.

DAVITY'S GEOGRAPHICAL COMPENDIUM

Pierre Davity, or d'Avity, Sieur de Montmartin, was born in 1573 at Tournon in Vivarais. He spent much of his life in Paris, where he was gentleman of the bedchamber to the king, and where he died in 1635. He published poetry that has made no name for itself and did other writing, little[2] of which has been thought worthy of recent reprinting. The work used by Milton was that of nearly twelve hundred pages, first published at St. Omer in 1614, under the title: "Les estats, empires, et principautez du monde, representez par la description des pays, moeurs des habitans, richesses des provinces, les forces, le gouvernement, la religion, et les princes qui ont gouverné chacun estat, avec l'origine de toutes les religions, et de tous les chevaliers et ordres militaires." In other editions the title appears in various forms, and the four letters thinly disguising the author's name appear as D. T. V. Y., T. V. Y. A., and D. V. T. Y. Immediately upon its appearance the book became popular: in sources easily accessible can be found references to about twenty French editions published before the year 1666, at St. Omer, Paris, Geneva, and Rouen. After the death of the author there appeared editions augmented by other hands, some of them in several volumes. Nor was that all. In 1615 was published an English translation, the work of Edward Grimstone. In Germany, however, Davity's book was much more popular than in England. This speaks well for it, because the Germans early made considerable progress in the study of geography and possessed a cosmography in their own language, the work of Sebastian Münster. There were published at Frankfort on the

---

[2] Only the last two titles under the head of "French Editions" in the bibliography at the end of his article.

Main, in the years from 1638 to 1695, at least four editions of the German translation of Davity made by Johannes Ludovicus Gotofredus.[3] The same translator also turned Davity into Latin, and at least three editions appeared at Frankfort from 1628 to 1649. There were, then, about thirty editions. Yet the fame of the work hardly outlived the century; a German edition, with additions by other hands, appeared in 1695, yet it was thirty years later than its immediate predecessor, a French edition published at Geneva. Edward Philips, writing in 1692, seems, by applying to Davity the words "the famous geographer of France in his time," to suggest that Davity—used by Milton between 1640 and 1647—was already out of date. However, since for fifty years editions of Davity appeared on the average at a rate somewhat higher than that of one every two years, his popularity was wide while it lasted. The different languages and places of publication, and the appearance of enlargements, make the general use of the work even more obvious than the mere number of reprintings. Milton's choice of this popular textbook of geography is like his choice, of which we learn from Philips, of the manual of astronomy by Joannes de Sacro Bosco, which for more than a century and a half was very generally used.

The Vogue of Davity's "Geography"

It seems strange to us of today, with our desire for the latest and most accurate information, that a compendium of geographical knowledge could remain in use for three quarters of a century; but in Davity's time the study of the natural sciences had not so developed as to demand every few years a rewriting of the books dealing with them. Yet the era of rapid development of knowledge had begun, even though writers were slow in adjusting themselves to it and often preferred to augment the old rather than to write anew. The long-continued popularity of the book suggests that the seventeenth century found it hard to discard after a few years such books as that of Davity, when once it had found them serviceable; but increasing knowledge was soon too strong for the not unwise conservatism of the time. Davity wrote when the period of discovery had hardly passed over to that of colonization. In 1614 Jamestown had been settled only seven years, and Port Royal, the first permanent French settlement in America, was but a few years older. The empire of the sea and of the New World still belonged to Spain. Davity, in fact, treats of the New World only under the dominions of Spain, then including Portugal, and speaks with respect, as a Roman Catholic,[4] of the bull of Pope Alexander VI which divided the newly discovered lands between Spain and Portugal. It is true that in his account of the Spanish dominions Davity mentions New France, saying that he will not there describe it, for he is dealing only with the parts of the world under the control of Spain, but he does not keep his promise. If the colonies of France are passed over with the barest mention, those of England are wholly neglected, though the name Virginia is used. Cabot is referred to as an Italian. Frobisher, indeed, is said to have been sent out by Elizabeth, and his northern voyages are given a few sentences. As a result, Davity's system was far from acceptable by the end of the century. It is not strange that the last edition of his book appeared in Germany, a country having little direct connection with the New World. Maritime and Protestant England could hardly be expected long to care for him; it is natural that the only English edition was an early one, even if England had not had its own Davity in Peter Heylyn. In France itself augmentation could not save the work to the end of the century.

---

[3] The Latin form of Johann Ludwig Gottfried. This name has generally been considered as a pseudonym of Johann Philipp Abelin. According to the catalogue of the Library of Congress (s. v. Gottfried), Frieda Gallati, in a dissertation entitled "Der königlich schwedische in Teutschland geführte Krieg," Zürich, 1902, has proved that Gottfried and Abelin were different men.

[4] Davity's Roman Catholic viewpoint appears in his account of the spread of Christianity in America and in such expressions as "*l'hérésie de Luther.*" Evidently Milton was not intolerant of Popish geography, or he would not have used the book.

DAVITY'S PREDECESSORS

It is apparent that Davity was not early enough to be a pioneer in his field; that honor belongs to Sebastian Münster,[5] who in 1544 published the first great modern cosmography. So completely did the volume resulting from the insight, learning, and energy of Münster meet the demand of the time, and so thoroughly did it establish itself, that in enlarged form it remained in use until after 1650, going through forty-six editions and appearing in six languages. Neither did Davity have the aid of a reputation gained in other fields to establish his fame. Peter Heylyn would be known if he had not written his "Cosmography," and the fame of Thomas Fuller as a man of letters undoubtedly assisted his geographical work, "A Pisgah Sight of Palestine," to obtain reprinting; but Davity had to rely for the fame of his book wholly on its own merits.

ESTIMATES OF HIS WORK

They were not sufficient to make his name an important one in the history of thought. The biographical dictionaries and the encyclopedias, "Biographie Universelle," "Nouvelle Biographie Générale," "La Grande Encyclopédie," and Ersch and Gruber's "Allgemeine Encyklopädie," give only brief articles on him. Charles Weiss, learned librarian at Besançon and contributor of many articles to the "Biographie Universelle," says of Davity's work:

> Ses Etats ou Empires du Monde . . . sont une compilation très-médiocre, où l'on trouve cependant des morceaux qui n'avaient pas encore paru en français, tels que l'histoire abrégée des rois de Perse d'après Mirkhond, que Davity traduisit de Texeira.

The writer in "Nouvelle Biographie Générale" comments:

> Ce livre est une compilation mal choisie, que les augmentations n'ont pas améliorée.

---

[5] See Viktor Hantzsch: Sebastian Münster, Leben, Werk, wissenschaftliche Bedeutung, *Abhandl. der philolog.-hist. Klasse der Königlich Sächsischen Gesell. der Wiss.*, Vol. 18, No. 3, Leipzig, 1898.

Baur, the writer in the "Allgemeine Encyklopädie," is less one-sided in his criticism, saying:

> Im Ganzen ist das Werk planlos, unkritisch und ohne Geschmack kompilirt, aber für die Zeit, in der es erschien, merkwürdig.

This attempt to consider Davity in relation to his environment is commendable, and the more necessary because his work has not endured. His popularity indicates that he was important in his age; yet none of his biographers recognize that popularity, none realize that his first edition was as early as 1614, and none give an adequate idea of the number of editions.

The Comprehensive Plan of His Compendium

Davity prefaces his work by declaring that the most necessary of all arts and sciences is that called the science or knowledge of the world:

> It is this knowledge which more than any other thing makes Families and Commonwealths to flourish, and the actions and words of those that understand it, pleasing both to great and small. This knowledge is gotten by the conversation of many, by divers discourses and reports, either by word or writing, by the managing of affairs, conference with straungers, voyages into divers places, the knowledge of divers humors, and in a word, by the judicious consideration of the manners and life of one and other. . . . A good part of this knowledge is comprehended in the discourse of this Booke, where you may see all sorts of persons and nations lively and naturally described, and represented with their manners and customes, as curiously as might be: so as if there lacks perfection in any part, this defect proceedes rather from the want of true relation, than from my diligence. I never undertooke this worke, but with a firme deseigne, not onely to make it pleasing . . . but also profitable, labouring to observe not lightly, but in intelligible tearmes, whatsoever may make the life of man either more happie, or more civile.[6]

Davity here sets for himself a tremendous task and one in harmony with the theory of the cosmographers of his day. Yet he narrows the field by giving up the attempt to include historical chronicles and endeavoring to give, as it were, what an intelligent and observant traveler might learn by a sojourn in any of the countries described. Hence, with exceptions, Davity does not give long historical passages such as interrupt the more purely geographical parts of Münster's "Cosmography." Yet Davity's plan is enough to appall any writer, no matter how diligent. It is evident that a work constructed upon the principle of including almost everything that man ought to know about the world in which he lives can hardly be other than a medley of incongruous information. We are quite prepared, without Davity's apology, to find it ill-balanced in its material, treating at length the religion of one country and scanting that of another. The difficulties, however, which Davity says he encountered were naturally not limited to him alone but were common to all who attempted to write of the whole creation. Samuel Purchas, for example, who in his "Pilgrimage" set out to tell of the religions of the world, but whose spirit is akin to that of the cosmographers, writes in his preface as follows:

---

[6] Grimstone's translation; see the bibliography. All of the translated quotations are from Grimstone.

> Where I have found plentifull discourse for Religion (my chiefe aime) I am shorter in other Relations; and where I have had lesse helpes for that discoverie, I insist more on the wonders of Nature, and discoveries by Sea and Land, with other remarkeable accidents.

The effect of having and not having books at his command is apparent in Davity's disproportionately long description of Persia, for which he relied on Teixeira.

Davity and Purchas followed the practice of their age, and we of the present may be thankful to the cosmographers for what they did, for they prepared the way for those who explain the relation between the civilization of a land and its physical features. Yet in the seventeenth century no one could offer to geographers a principle for dealing with the culture of a land. Milton, for example, in the preface of his "Moscovia," says that a geographer should concern himself not merely with latitudes and longitudes but also with "other relations of manners, religion, government, and such like, accounted geographical." He feels that geographers have not generally been successful in doing this but "have for the most part missed their proportions. Some too brief and deficient satisfy not; others too voluminous and impertinent cloy and weary out the reader, while they tell long stories of absurd superstitions, ceremonies, quaint habits, and other petty circumstances little to the purpose." Yet Milton is unable to offer any principle except that the geographer should be "learned and judicious" and should select and present what is "useful" and "worth observation." However, he endeavors to exemplify his method in his "Moscovia," which he intended as a "pattern or example to render others more cautious hereafter." We should, then, be lenient with Davity and feel that extreme condemnation of his work is likely to be in part an attack on the age rather than on the man himself. He succeeded, even with his faults, in giving much that is of value, enough at least to recommend himself to so critical a man as Milton; he is not verbose and he avoids the trivial.

THE ARRANGEMENT AND TREATMENT OF THE MATERIAL

Furthermore, though Davity's work as a whole is something of a medley, the matter of its individual parts is not ill arranged. He remarks in his preface:

> If any one will vouchsafe to cast his eyes upon this worke . . . he may in a manner at the first view, observe what I say, and seeing the distinction which I use and the order which I hold throughout all the whole booke, he may easily judge, that beside the Readers content, I have sought their profit.

This list of the sections of his description of England is representative:

> 1. Introductory section giving boundaries and general description. 2. "Qualité du Pays." 3. "Meurs des Anciens Anglois." 4. "Meurs de ce Temps." 5. "Richesses d'Angleterre." 6. "Forces d'Angleterre." 7. "Gouvernement d'Angleterre." 8. "Religion d'Angleterre." 9. Tables of kings and bishops.

Such divisions are further subdivided into numbered sections. At the head of the entire account is given an outline of them, which partly atones fo the lack of an index (supplied in the German edition). The headings use by Davity were not of his own devising but were common property. Som of them are found in Münster, and some in the text of Mercator's ''Atlas.

Notwithstanding the cosmographic nature of his work, Davity had principle to govern his writing, which, so far as he depends on it, gives hi production something of unity and differentiates it from the cosmographie Unfortunately he often loses sight of it. His preface states that his ''firs and chief designe was to deal only with politic and civil matters.'' Realiz ing that descriptions of the countries he dealt with were needed, he adde them. Then he noted the customs of the lands, that the reader might judg which were better, their ancient or their present conditions. He adde accounts of their wealth, to show its influence on government. In orde to explain how this wealth might be protected, and the countries that enjo it preserved, he told of their military power. But since all is vain withou government, he gave an account of that. Even religion he considered i its relation to the state:

> I would not omit the principall peeces of Commonweales, the which is Religio whereof I have discoursed, to shew that it is the feare of some divinitie which mai taines people in their duties, makes them obedient to their princes, and diverts the much more from all bad desseignes, than armes and souldiers which environ and threate them. I doe it also to shew, that whereas religion wants, of what sort so ever it b policie and order faile in like manner, and barbarisme, confusion, and rebellion, raig there in a manner continually.

Not only does this gentleman of the court write with political power a his first concern, but he writes partly for an audience concerned wit affairs of government, mentioning, among those to whom his writings ma be of use, princes, who may derive from it means of governing better noblemen, who may gain wisdom for rule and diplomacy; courtiers, wh may be enabled to compare their own country with others; soldiers, lawyer and those who ''deal in the managing of affairs and businesses of estate. Finally, no desire of glory led him to write, but the ''desire he had to b profitable to his country.'' Nevertheless, Davity does not, even in hi preface, set forth a theory of political geography and, as a result, in th body of his work he is far from putting one into practice. Yet his dominan political interest appears not only in the space he gives to governmen and military power but also in his arrangement of matter. He deals wit independent countries by continents but treats dependencies not accordin to geographical position but under the country to which they owe allegianc When, in his description of Europe, he comes to Spain he describes no merely the lands of the Iberian peninsula but all the countries owing fealt to the Spanish crown, in Italy, Africa, America, and the Orient, prefacin with the words:

> A fin de n'embroüiller pas le Lecteur, et ne luy faire chercher tous les Estats q sont soubs le Roy d'Espagne en divers endroits de ce livre, i'ay pensé qu'il seroit plus

ropos de mettre icy tout à la fois toutes les terres qu'il possede, et apres en avoir faict denombrement en general, considerer distinctement les particularitez plus remarquables.[7]

Perhaps this method accounts for Davity's failure to say much of North America. He had no section on America; Virginia and New France were olonies too new and weak to be sources of income to their mother counries, and the geographical works Davity may have used as guides did not onsider them under England and France.

Value of the Political Method of Treatment

Apart from the advantage to be derived from following where his tastes ed, Davity showed wisdom when he selected for his work a political scheme. Here was a way of looking at the world on which the men of his time had a grasp. Statecraft was a study to which many had applied themselves and of whose principles they had some appreciation. Hence, a political system for a book describing the nations of the world was then a living one. Men were reflecting on the relations between wealth and military power, between religion and national strength. Machiavelli had not written n vain; students were quick to consider

> What makes a nation happy, and keeps it so,
> What ruins kingdoms, and lays cities flat.[8]

The geographical conception, on the other hand, was not vital or organic. Relations of countries to continents and to the earth as a whole, relations of peoples to the lands they occupied, and effects of the distribution of natural products had not yet been brought into a geographical system. The "Atlas" of Mercator, for example, describes countries only as independent entities. Even descriptions of single countries and provinces are without geographical unity, for the details are independent facts. Hence Davity did well to adopt a plan which would give his work more life, for, though he carried it out imperfectly, his plan does produce a certain effect of unity. Yet national development and decline soon made useless a description of the world according to political relations. Furthermore, the best system for a work describing the lands of the whole world is a geographical one, having its basis in the study of physical features and their influences. Works on politics, not works on geography, are fitted to the political system. Modern geography is obliged to regard political boundaries—part of its problem is the study of their relation to the physical facts of geography—but it works more freely when they need not be regarded. One of the reasons, pointed out by the editor, for the excellence of the article on the United States in Mill's "International Geography" is that it deals with a great section of country unhampered by political boundaries. When Davity wrote, the political method was the better, but the geographical method had in it superior powers of development. Ther as always, men of insight understood particular geographic relations, bu the time for their systematic presentation had not come. Even today th dependence of the civilization of a country upon its physical features i not fully understood.[9]

---

[7] Taken, like other French quotations that follow, from the French edition of 1625 (Rouen). Grimstone's translation was not available for some of the excerpts; and, since Milton used the work partly for the sake of its language, it may be interesting to the reader to have some samples of Davity's French.

[8] Milton: Paradise Regained, Bk. 4, ll. 362-363.

DAVITY INFLUENCED BY BOTERO'S "RELATIONI"

A work by which Davity seems to have been greatly influenced, particularly in his assignment to politics of an important place in his work, is tha by Giovanni Botero, entitled "Relationi Universali."[10] Botero divides hi work into four parts, which may be considered separate treatises. Th First Part, covering about three hundred and twenty pages, besides indexes, gives a general description of the countries of the world, takin first the continents and then the islands, and is provided with maps. Th Second, about half as long, deals with the more powerful princes of th world and with the causes of the power and wealth of their states. Th Third, longer than the Second, treats of peoples of every religious belie Catholics, Jews, Gentiles, and schismatics. In the Fourth, and shortest Part is an account of the superstitions of the New World and of th spread of Christianity there. The Second Part is most obviously relate to Davity's production, because of its political interest, and there appea in it headings similar to his, such as "Richezza," "Governo," "Forze," "Principi Confinanti." Davity has, as it were, taken the method of thi part, and, by adding sections, has used it for all the matter he has to giv on a country, thus bringing into one place, in the manner of the cosmographer, what Botero has systematically distributed among his separat parts.

BOTERO'S SCIENTIFIC SPIRIT

In the Proemium of the Second Part Botero writes that it is easy t tell of the events that occur in the world but that to explain the causes o the greatness of states requires ability and judgment. These causes ar multitude of people, valor, wealth, advantageous situation, and opportunity. He speaks of the relative advantages possessed by peoples livin in mountainous regions and those living on plains, illustrating from Grea Britain, where the Welsh and Scotch Highlanders were easily kept at ba by the inhabitants of the lowlands. He also mentions islands, illustratin from Sicily—attacked at the same time by Athenians and Lacedaemonians and later by Romans and Carthaginians—in a way that suggests recen eographical exposition.[11] In the Second Part itself Botero says much of he connection of the second of war's "two main nerves, iron and gold," with a country's climate, fertility, natural products, and fitness for commerce. He deems the natural resources of a land, especially its supply of ood, a chief source of military greatness. Nations are considered both s to the natural features which make them easy to attack and defend nd as to the general strategic advantages of their situations in different arts of a continent or even of the world. He says, for example: "Just s the situation of Italy appears made by nature for the rule of the Mediterranean Sea, so that of Spain seems designed for the empire of the Ocean."[12] Though Botero is of significance in the history of geographical heory, his treatise is not on political geography, but rather one on politics n which geography is prominent. His point of view is that of the politician rather than of the student of natural science; yet he has so just n appreciation of the effect of geographical conditions on states, and the pirit of his work is so like that of the present day that at times a reader lmost forgets that it was written two centuries and a quarter ago.

---

[9] See, *e.g.*, Ellsworth Huntington: The Geographer and History, *Geogr. Journ.*, Vol. 43, 1914, pp. 19-32.

[10] The "Relationi," of which I have used the Italian edition of 1597, appeared in 1591, and were ofte reprinted in Italian, and translated into English, German, Latin, and, judging from the letter prefixed t the Fourth Part, French. An account of Botero, with references to other works dealing with him, is give by Professor Francesco Flamini in the volume "Il Cinquecento" (pp. 461-462) of the "Storia Letterari d'Italia." He especially remarks that Botero anticipated some of the conclusions of recent students c politics.

Davity versus Botero

One may be tempted to ask why Milton did not employ as a textbook, nstead of "Les États," this work by a man superior to Davity in intellectual power. There is, indeed, no evidence that Milton was acquainted with it; yet the circumstances of his life, such as his journey to Italy, make it probable that he had seen it. Still the French work, in Milton's day at the height of its popularity, was doubtless more easily obtained. Milton may also have felt that Botero dealt too much with political economy and was too difficult for his pupils. He wished them, when they read geography, to have pictures of the lands of the globe rather than theories about them. Botero was fitted for a somewhat later stage in the curriculum of Milton. Especially since his pupils, when they read Davity, were learning French and Italian, the easier work would have advantages. Perhaps, also, having selected Villani's work for Italian reading, Milton chose Davity because he wrote in French. Furthermore, Davity does take from its theoretical setting a considerable amount of Botero's material.

Davity's Use of Borrowed Material

In his selections from this material Davity shows good judgment, though in his work they lose their effect as part of a system and become isolated facts. Among them are passages which suggest the writings of recent geographers, of which the following are examples. The first is from the section on "Riches" in the description of France:[13]

---

[11] The same illustration is used by Miss Semple in "Influences of Geographic Environment," New York, 1911, pp. 427-428.

[12] Found also in Münster's "Cosmography," edit. of 1628, p. 139. I cannot say whether this is original with Münster or with Botero; the German writer did not lack geographical insight.

All the soyle of France, of what sort soever it be, is good for something, for in places where there is no wine, there growes corne, and where there is no corne, there are chestnuts and pasture. To conclude, there is not anything but doth serve; whereas if we consider Italie, the Apennine hils containe, in a manner, a fourth part, all which is for the most part rockie, and of no profit: and Spaine being a great countrie, is full of unprofitable wasts. The mountaines of Auvergne have much good ground, and many places that are rich, full of fruit, abounding in cattell, from whence they draw much flesh, butter and cheese, like unto the mountaines of Vivarez, Velay, Gevavdan, Sevenes, Dauphine, Forest and Provence. The rest extendes it selfe into goodly Champian fields full of corne, or into little hils which are verie fertill, or valleis covered with grasse, fit to feed cattell. A man would say, that there is aboundance in all places with diversitie, and profit with the beautie of the countries. And this realme hath this peculiaritie, that all her provinces may easily communicate their commodities and fruits one unto another, by the meanes of a great number of navigable rivers that are in it; for in the province of Anjou alone, they number fortie rivers great and smal. Wherfore the deceased Queene mother Katherine de Medicis, sayd, That there were more navigable rivers in France than in all the rest of Europe: wherein she did not much stray from the truth. The fertilitie of the soyle, and the commoditie of rivers, for the transporting of wares, is the cause of the multitude and beautie of the townes and places of France, most of which are seated upon their banks. And although that France doth not want good ports, and many, yet the greatest townes stand not upon the Sea; the which shewes that their greatnesse comes not from abroad, but is domesticke: For the maritime townes are greater than those that are within the countrie, when as they receive more profit and support from the sea, than from the land, as we see in the cities of Geneva [Genoa], Venice, and Ragouse.

The following is from the section on "Forces de Perse":[14]

Persane a un autre defaut important, qui est le manquement d'union, et ceste division procede de deux causes: l'une est la grandeur des Princes, qui est ordinairement accompagnee d'orgueil, et d'opiniastrise: l'autre est le difficulté de la conduitte, et des voyages: et ce defaut vient du manquement des eaux et des rivières navigables. Car les rivières de Perse sont telles qu'on ne va point dessus, ou si l'on y va c'est si peu, que ce n'est pas chose qui puisse grandement servir. Toutes ces rivières courent, ou au Golphe Persique, ou à la mer Caspie, laissant le pays du milieu sans eau, à raison dequoy elles servent peu pour voir les forces des Persans, et les mettre ensemble, veu que le milieu du Royame demeure sec, et n'y a aucune rivière qui soit commune presque à tout l'Estat, comme pourroit estre la rivière de Loire à la France, le Po à la Lombardie, la Vistule à la Pologne, la Schelde à la Flandre. Il y a outre ce force deserts, et montagnes qui traversent et divisent le pays: à raison de quoy ce Royaume est fort semblable à l'Espagne, où il ny a point de rivières de grand trafic, si ce n'est aux extremittez, et où il y a force montagnes, et beaucoup de contrées comme desertes, à cause de leur sécheresse.

And this is from the Rouen edition of 1625:[15]

Premièrement les Isles Açores sont tellement importantes à la Couronne d'Espagne pour leur assiette, que sans elle la navigation d'Ethiopie, des Indes, du Brasil, et nouveau Monde ne pourroit etre continuée; d'autant que les flottes qui viennent des dites contrées à

---

[13] This passage is taken from Botero, Part II, p. 2. Cf. Ellen C. Semple: Influences of Geographic Environment, pp. 353-354.

[14] Taken from Botero, Part II, p. 93.

[15] p. 253; taken from Münster, p. 140, or Botero, Part II, p. 141.

> Seville, ou à Lisbonne ne peuvent presque faillir d'y aborder toutes, c'est à sçavoir celles du Ponent pour suyvre leur route, et celles du Levant pour gagner les vents qui leur sont favorables.

This dependence on Botero is not exceptional, but normal; indeed Davity freely draws matter of every sort from other compilations. Sometimes even passages which from their nature might be thought his own are taken from other works. As an example, for his description of England he borrows from Münster's "Cosmography," one of his favorite sources, a comparison of the English with the Spanish in their conceit of national superiority. This is more than Grimstone, the English translator of Davity, can endure, and he omits it. Unfortunately, in Davity's time Münster's work was well-nigh out of date. Davity draws also from the enlarged edition of Mercator's "Atlas," sometimes employing the exact words of the French translation, the preface of which is dated 1609. The text is a laborious compilation, of cosmographic nature, which owes its final form to Petrus Montanus (Pieter van den Berghe). One can never be sure that an apparently learned reference to a classical author has for Davity any other source than the "Atlas." His willingness to take material word for word from such a work does not speak well for his command of sources. Yet he often makes good use of his borrowed matter, as, for example, the passage on Spanish manners, which he takes from the description of Spain in the "Atlas" and inserts in his own description.

MILTON'S AND HAKLUYT'S PRINCIPLE OF USING ONLY ORIGINAL SOURCES

This dependence on compilations was doubtless one of Milton's chief objections to his work, for it is a cardinal point of the poet's theory of geographical writing that only the narratives of eyewitnesses should be employed by the compiler—a principle which Milton so far as possible exemplifies in his "Moscovia." Possibly he learned to apply it from Hakluyt, who asserts:

> To the ende that those men which were the paynefull and personall travellers might reape that good opinion and just commendation which they have deserved, and further, that every man might answere for himselfe, justifie his reports, and stand accountable for his owne doings, I have referred every voyage to his Author, which both in person hath performed, and in writing hath left the same: for I am not ignorant of Ptolomies assertion, that Peregrinationis historia, and not those wearie volumes bearing the titles of universall Cosmographie which some men that I could name have published as their owne, beyng in deed most untruly and unprofitablie ramassed and hurled together, is that which must bring us to the certayne and full discoverie of the world.[16]

And his follower, Samuel Purchas, writes in the preface of the "Pilgrimage," his compilation, a sentence which might be aimed at Davity:

> I have laboured to reduce Relations to their first Authors, setting their names to their Allegations: the want whereof hath much troubled mee, whilst the most leave out their Authors, as if their owne assertion were sufficient authoritie in things borrowed.

---

[16] Preface to the first (1589) edition of "The Principall Navigations."

The ideal of Hakluyt is nobler than that of Davity, yet the world also needs those who, like the French writer, give in pleasing and popular form the information needed by the many for whom the mention of authorities is needless; and who, as Milton—thinking of the ponderous collection of sources made by Hakluyt—puts it, "save the reader a far longer travail of wandering through so many desert authors." [17] Milton, by his willingness to use Davity, testifies that the Frenchman succeeded as a popular compiler, if he did fail to reach any higher plane.

Some of Davity's Authorities

Furthermore, though insufficiently critical, Davity used, and certainly sometimes used directly, some of the best books to be obtained, part of them giving the personal observations of their authors. His section on Persian history comes from Teixeira; for Russia, though he does not use any of the valuable English narratives which Milton employed in "Moscovia," he depends on von Herberstein; for northern Africa the relations of Leo Africanus, still of value, are his sources; he has made good use of Marco Polo's description of China; in his account of Iceland he mentions Angrim Jonas; and in that of India João de Barros, historian of the Portuguese in the Orient. He also knew of the collection of works of travel by Ramusio. Paulus Jovius, some of whose work appears in it, and whom Davity names, was thought by Milton worthy of a place in the preface of "Moscovia." French travelers and men of science of his own or the preceding age whom he mentions are the Baron de Beauvau, Gilliez, Belon, and Palerne.

Even though, as has been said, part of Davity's description of France is from Botero, much of it is probably original. At least it moves off well, though it seems rather highly colored, as the writer enlarges on the excellences of the land he loved. He may have learned from men he met in Paris, who were especially familiar with various parts of France, of the characteristics he assigns to the various provinces, though his words often suggest the recollections of a traveler. The description of Paris, where he spent years, is striking. His account of his native province of Vivarais, though revealing some vanity, is lively and concrete. He has much to tell of the industry, intelligence, and bravery of the people and distinguishes between the inhabitants and products of the hills and those of the valley of the Rhone.

Sources of Milton's Geographical Knowledge

Since Davity's work is a compilation from well-known sources, his various descriptions have few distinctive features. Hence, though Milton must have become familiar with "Les États" in the course of his teaching, the writer has not been able to find in his writings any clear traces of his acquaintance with it. His geographical knowledge depended, in fact, on many of the writers from whom Davity drew, at least so far as they were Greek and Latin authors or so far as their writings were found in the widely inclusive collections of Hakluyt and Purchas. Milton felt that the geographical knowledge of a highly trained poet should be of a more thorough sort than could be obtained from compendiums alone; or, if he chose to depend on a work of reference rather than on the narrative of an actual observer, he did not select Davity's production.

---

[17] Preface of "Moscovia."

A compilation of which Milton is known to have made use is the "Pilgrimage" of Samuel Purchas. He was a more scholarly man than Davity, and his work bristles with references to the many books he consulted. He had, also, some critical power and was able, partly because of the zeal with which he studied his subject, to write with something of the spirit of an actual observer. He is often more detailed and hence often more interesting than Davity. Even his liking for the marvelous was apparently sometimes a recommendation in the eyes of Milton. A particular instance will make this plain. Davity gives a sober and, in the light of recent knowledge, substantially correct description of Mt. Amara (Debra-Damo) in Abyssinia, as follows:

> En la partie plus Occidentale de la Province de Barnagas on void une montagne, qui estant assez spacieuse au commencement se va restrecessant peu à peu, puis s'eslargit de nouveau en forme de champignon, et a environ une petite lievë de tour. On void au dessus des bastiments royaux, une Eglise, et un Monastère, et deux fort grandes cisternes, et un espace de terre, qui peut entretenir aisément cinq cens hommes. On n'y peut aller que par un endroit, et encor jusques à certaine marque seulement, au delà de laquelle on ne peut monter qu'avec des cordes et des paniers: et pour conclusion ce lieu est de telle sorte qu'il ne peut estre prins par force à cause de sa hauteur, ny par famine, à cause que les vivres y croissent.[18]

Davity tells elsewhere that the emperor lays up his treasures in the mountain and keeps there his kinsmen and sons. This is evidently not the source of the following in "Paradise Lost":

> Nor where Abassin kings their issue guard,
> Mount Amara, though this by some supposed
> True paradise, under the Ethiop line,
> By Nilus' head, enclosed with shining rock,
> A whole day's journey high.[19]
>
> It was a rock
> Of alabaster, piled up to the clouds,
> Conspicuous far, winding with one ascent
> Accessible from earth, one entrance high;
> The rest was craggy cliff, that overhung
> Still as it rose, impossible to climb.[20]

---

[18] p. 1291. Taken from Botero, Part I, p. 168. Davity does not use the name Amara.

[19] Milton: Paradise Lost, Book 4, ll. 280-284.

[20] *Ibid.*, Bk. 4, ll. 543-548. There are many other suggestions of Mt. Amara in Milton's descriptions of paradise. Cf. especially Bk. 4, ll. 144-155, 182; Bk. 8, ll. 303-307; Bk. 12, ll. 639-640. See also Cooper: The Abyssinian Paradise in Milton and Coleridge, *Modern Philology*, January, 1906.

The passages plainly come from Purchas, part of whose account runs thus

> This Hill [Amara] is situate as the Navill of that Ethiopian Body, and Centre o their Empire, under the Equinoctiall Line, where the Sunne may take his best view thereof, as not encountring in all his long journey with the like Theatre, wherein the Graces and Muses are Actors, no place more graced with Natures store. . . . Once Heaven and Earth, Nature and Industrie, have all beene Corrivals to it, all presenting their best presents, to make it of this so lovely presence, some taking this for the place of our Fore-fathers Paradise. . . . It is situate in a great Plaine largely extending it selfe every way, without other hill in the same for the space of 30 leagues, the forme thereof round and circular, the height such, that it is a daies work to ascend from the foot to the top; round about the rock is cut so smooth and even, without any unequal swellings, that it seemeth to him that stands beneath, like a high wall, whereon the Heaven is as it were propped: and at the top it is overhanged with rocks, jutting forth of the sides the space of a mile, bearing out like mushromes. . . . It is . . . compassed with a wall on the top. . . . The aire above is wholesome and delectable, and they live there very long, and without sicknesse. . . . I should lose both you and my selfe, if I should leade you into their sweet, flourishing, and fruitful gardens, whereof there are store . . . plentifully furnished with fruits . . . and varietie of herbes and flowers, to satisfie the sight, taste and sent. . . . The plentie of Graines and Corne there growing, the charmes of birds alluring the eares with their warbling Notes, and fixing the eyes on their colours, joyntly agreeing in beautie, by their disagreeing varietie, and other Creatures that adorne this Paradise, might make me glut you . . . . with too much store. . . . The Princes of the blood Royall . . . are sent to this hill at eight yeeres old, and never returne thence, except they be chosen Emperours.[21]

CONCLUSION

It appears, then, that Milton selected Davity's work not because it was adapted to his personal use but because it was suitable for his young pupils. Davity's French, that of a literary man familiar with Paris and the court, gave practice in the use of the language. Milton did not choose his production for its language alone but because it contained valuable matter, giving concisely something of descriptive geography and in addition "those other relations of manners, religion, government, and such like, accounted geographical," which the poet thought important. Though he did not think it a model geography, he did feel that it was the best work for his purpose to be obtained and that, when supplemented by the works of classical geographers and illustrated by maps,[22] it was fairly well suited to give his pupils a general knowledge of the chief countries of the earth.

---

[21] Purchas His Pilgrimage, pp. 743-745 (from the edit. of 1626, which Milton used). The description in Münster is more like that of Purchas than that of Davity.

[22] The French editions are, so far as can be learned, without maps. The maps in the German editions are the insertion of the German publisher.

Bibliography

The following bibliography may make more evident the popularity of “Les États” under various titles. Of the editions mentioned I have seen the French of 1625 (Rouen), the English of 1615, and the German of 1646. On account of the nature of the sources of this bibliography—the encyclopedias and biographical dictionaries mentioned in the article, the “Bücher-Lexicon” of Heinsius, “Les Supercheries Littéraires Dévoilées” by J. M. Quérard, and the catalogues of the British Museum, the Bibliothèque Nationale, the New York Public Library, and the Library of Congress—I cannot vouch for its accuracy in all details:

French Editions

Les estats, empires, et principautez du monde, representez par la description des pays, moeurs des habitans, richesses des provinces, les forces, le gouvernement, la religion, et les princes qui ont gouverné chacun estat, avec l'origine de toutes les religions, et de tous les chevaliers et ordres militaires. Par le Sr. D. T. V. Y. gentilhomme ordre. de la chambre du roy. À S. Omer, chez Charles Boscard, imprimeur, 1614.

Published also under the title: Les empires, royaumes, estats . . . et principautez du monde . . . S. Omer, 1614.

Les estats . . . Paris, 1617, 8vo.

Les états . . . Genève, 1619, P. Aubert, 4to.

Les estats . . . Paris, 1619, 4to.

Les états . . . St. Omer, 1621-22, 2 vols., 4to.

Les estats . . . Rouen, 1625, A. Ovyn et Jacques Cailloue.

Les estats . . . Paris, 1625, P. Chevalier, folio.

Les états . . . Paris, 1626, folio.

Les états . . . Rouen, 1633, 4to.

Les estats . . . Paris, 1635, A. Courbé, folio.

Le monde, ou la description générale de ses quatre parties, avec tous ses empires . . . Paris, 1635, 5 vols., folio.

Le monde . . . Paris, 1637, C. Sonnius, 5 vols., folio. [Additions by François Ranchin.]

Description de l'univers . . . Paris, 1637.

Le monde . . . 2e édition, Paris, 1643, C. Sonnius et D. Bechet, 5 vols., folio. [Additions by Ranchin.]

Les estats . . . Rouen, 1644, 8vo.

Les estats . . . Genève, 1648, J. Stoer, 4to.

Les estats . . . Rouen, 1649, J. Cailloüé, 4to.

Les estats . . . Paris, 1655, A. Courbé, folio.

Les estats . . . Genève, 1655, J. A. et S. de Tournes, folio.

Nouveau théâtre du monde, contenant les estats . . . Paris, 1655, P. Menard, folio.

Le monde . . . Nouvelle édition revue par Jean-Baptiste de Rocoles . . . Troyes, Paris, 1660, D. Bechet et L. Billaine, 6 vols., folio.

Le monde . . . Genève, 1665, folio.

A supplementary portion of “Les états”: Liste et origine de tous les ordres de chevaleries militaires et civils, qui ont été institués par les Papes et par les Princes chrêtiens, jusqu'à la fin du xvie siècle . . . Publié séparément pour la premier fois par les soins de M. J. Gay, Turin, 1876.

A selection from the edition of 1619 in Vol. 10 of the “Collection des anciennes descriptions de Paris,” edited by l'abbé Valentin Dufour, Paris, 1883, A. Quantin.

Latin Editions

Archontologia cosmica; sive imperiorum, regnorum, rerumque publicarum omnium per totum terrarum orbem commentarii . . . Jo. Ludovici Gotofredi . . . primo gallice per D. T. V. Y. . . . Francofurti ad Moenum, sumptibus Luca Jennisi, 1628.

Archontologia cosmica . . . Frankfort, 1629.

Archontologia cosmica . . . Frankfort, 1638, folio.

Archontologia cosmica . . . Frankfort, 1649, 3 vols., folio.

German Editions

Newe archontologia cosmica, das ist Beschreibung aller Kaÿserthumber, Königreichen und Republiken der gantzen Welt . . . durch Johann Ludwig Gottfried . . . mit den vornehmsten in Kupffer gestochenen Land-taffeln und Stätten gezieret und verlegt von Mattheo Merian. Franckfurt am Mayn, W. Hoffmans Buchtruckerey, 1638.

Newe archontologia . . . Franckfurt, 1646.

Beschreibung aller Kaiserthümer . . . Franckfurt, 1649, folio.

Vermehrte archontologia cosmica . . . Franckfurt, 1695, folio.

A selection in: Orbis lumen . . . das ist . . . newe . . . Beschreibung der ganzen Welt, 1658.

English Editions

The estates, empires and principalities of the world . . . Translated out of French by Edw: Grimstone, sargeant at armes. London, printed by A. Islip for M. Lownes and John Bill, 1615.

A translation of a selection entitled: An accurate description of the Island and Kingdom of Sicily . . . To which is added, a narrative of the Island of Sardinia . . . by D. Macnab. London, 1786, 8vo.

FROST IN THE UNITED STATES

By ROBERT DeC. WARD

Harvard University

PREVIOUS FROST MAPS OF THE UNITED STATES

There have been three general stages in the charting of our knowledge of frost occurrence in the United States. In the earlier maps the average dates of the first and the last killing frost were based on records obtained at regular Weather Bureau stations.[1] In all these maps the lines of equal frost dates were left incomplete over much of the West, owing to lack of adequate information, but in the later maps of this first stage (1906) the average dates of the first and the last frost were entered at certain Weather Bureau stations over the Western plateau and on the Pacific Coast although the lines themselves were not drawn. The information given on all these maps was obviously based on very insufficient data. Observations at regular Weather Bureau stations, which are located chiefly in large cities, do not show actual conditions of frost occurrence over the rural farming districts and are too few in number for accurate generalization.

A second stage was reached when, in addition to the data obtained at the regular stations of the Weather Bureau, observations made by co-operative observers, widely scattered over the country, were also taken into account. By the inclusion of these additional data a much more accurate and more complete view of frost conditions was gained. Maps based on this larger series of observations, including those made at approximately 1,000 co-operative observers' stations having the longest records (usually about 10-30 years), were published in 1911.[2] This investigation included maps of the average dates of the first and the last killing frost; of the earliest and latest dates on which killing frosts have occurred in autumn and spring respectively; and of the average length of the crop-growing season. This new set of maps brought out, much more clearly than had been done before, the influence of local conditions upon frost occurrence. Lines were drawn for the Eastern sections, while dates only were still used over the Western mountain and plateau districts and on the Pacific Slope.

THE NEW MAPS OF THE "ATLAS OF AMERICAN AGRICULTURE"

A third stage has been reached in the recent publication of the very valuable and comprehensive study of frost which forms Section 1 of

---

[1] A. J. Henry: Climatology of the United States, *U. S. Weather Bur. Bull. Q*, Washington, D. C., 1906, ext, pp. 33-34, Pls. XIX and XX. See also previous charts in A. W. Greely: American Weather New York, 1888, pp. 269-270, frontispiece and Chart XXIII. These maps were reproduced in F. Waldo: Elementary Meteorology, New York, 1896, pp. 333-335; Figs. 103 and 104.

[2] P. C. Day: Frost Data of the United States and Length of the Crop-Growing Season. As Determined from the Average of the Latest and Earliest Dates of Killing Frost, *U. S. Weather Bureau Bull. V*, Washngton, D. C., 1911.

Part II of the "Atlas of American Agriculture."[3] Frost records ar now available from about 4,000 regular and co-operative stations of th Weather Bureau. About 600 cover a period of twenty years (1895-1914) which was adopted for most of the climatic material in the new atla About 1,800 cover over ten but less than twenty years, and the remainin 1,600 are for shorter periods, none less than five years. All of these dat have been verified by experts familiar with the locations of the variou stations and with the surrounding districts. The general author, Willia G. Reed, formerly Assistant in Agricultural Geography, Office of Far Management, had the co-operation, in the preparation of some of the maps of Dr. Charles F. Brooks and of Messrs. F. J. Marschner and H. R. Tolley The publication presents the whole subject of frost with a detail no hitherto attained, so far as the present writer is aware, in any other are of equal size anywhere in the world. As a new and very important contribution to American climatology, it deserves more than a brief mentio in the *Geographical Review.*

Nature and Occurrence of Frost

Frost is not a simple phenomenon. It appears in varying degrees o severity ("light," "heavy," "killing"), and the line between these is no easily drawn. A frost of a certain type of severity does not necessaril cause the same amount of injury to all kinds of vegetation. Temperature low enough to injure plants often occur without any frost deposit. Again frost is characteristically "patchy" in its occurrence. Given generall favorable weather conditions, its actual occurrence is largely a matter o topography and of air drainage. Frosts in winter have little or n economic importance except in the South and the Southwest. In summe they do not occur except in certain elevated areas. Thus it is that sprin and autumn frosts are of such critical significance. For frost to occu the general weather conditions must be favorable. These are now reasonably well understood, as the result of long experience in forecastin Type maps, characteristic of frost weather, may be selected for th various sections of the country (Figs. 6-15 of the atlas). These are ver useful for purposes of local frost study and in general teaching. Indeed the investigation of frost, to be really useful, must be highly intensiv and very local. Every area has, in a sense, its own special and peculia frost conditions and needs its own special "thermal survey."

The traditional frost maps give the average dates of the last killing frost in spring and of the first killing frost in autumn. To these is usually added a chart showing the average length of the growing season, between the first and last frost dates. In the present monograph far more detail is included. By reference to the mean daily minimum temperatures fo ny station it is easy to determine the date on which, in the general ourse of the seasonal decrease of temperature in autumn, this minimum alls below freezing. Similarly, in the spring, the average date on which he mean daily minimum rises above freezing may be determined. If first nd last frosts came regularly on these dates, the whole frost problem ould be perfectly simple. Frost, however, is characteristically variable n its dates of first and last occurrence. Cyclonic and anticyclonic spells f colder or warmer weather, coming irregularly and without much regard o the normal seasonal temperature curve, easily advance or retard the ctual dates of the first and the last frost. Thus it is that there are likely o be considerable departures from the average dates, and a complete study f frost must include a consideration of these variations.

---

[3] W. G. Reed: Frost and the Growing Season, Pt. II, Sect. 1, Atlas of American Agriculture, prepare under the supervision of O. E. Baker, Office of Farm Management, U. S. Dept. of Agriculture, Advanc Sheets, 2, issued July 15, 1918, 12 pp. folio.

THE LAST KILLING FROST IN SPRING

The atlas includes two double-page maps, in color, showing the average ates of the last killing frost in spring and of the first killing frost in au- umn, based on the 20-year period 1895-1914 (Figs. 3 and 20). On the first f the two, lines are drawn for the first, eleventh, and twenty-first day f each month from March 1 to June 1 over the areas east of the Rocky ountains, and from the Rocky Mountains westward for the first of ach month only. The accompanying figure (Fig. 1) has been simplified nd generalized by the present writer from Figure 3 in the atlas. It ives the essentials, not the details, of the original map. The general ast-west trend of the lines in the East shows that latitude is here the

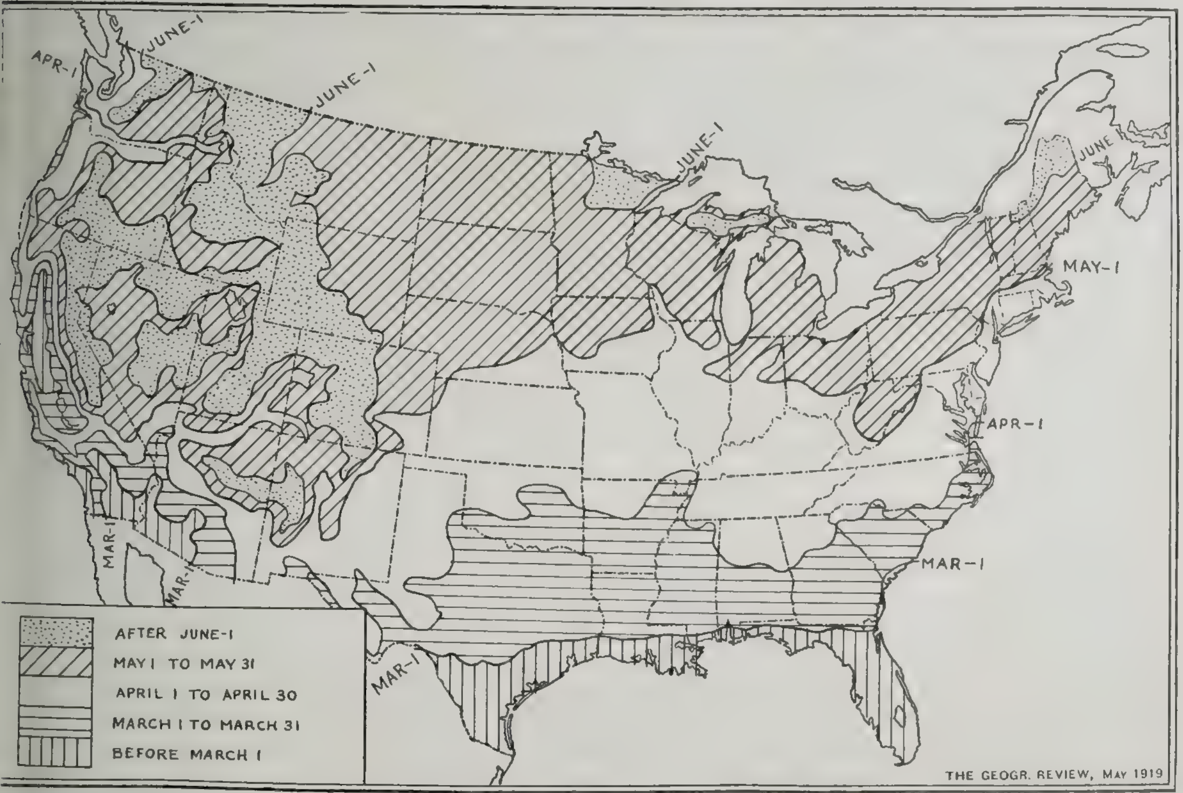


FIG. 1—Map of the United States showing the average dates of the last killing frost in spring. cale, 1:45,000,000.

chief control, although the deformation due to large bodies of water an to topography is also obvious. In the West altitude and the influenc of the Pacific Ocean are the chief controlling factors. In view of th complex topographic controls over frost occurrence in the West and o the further fact that the reporting stations are mostly at the lower level it is impossible to draw the lines with great accuracy or detail.

The earliest date shown on the map is March 1. The area over whic frost does not occur annually includes the southern half of Florida; th

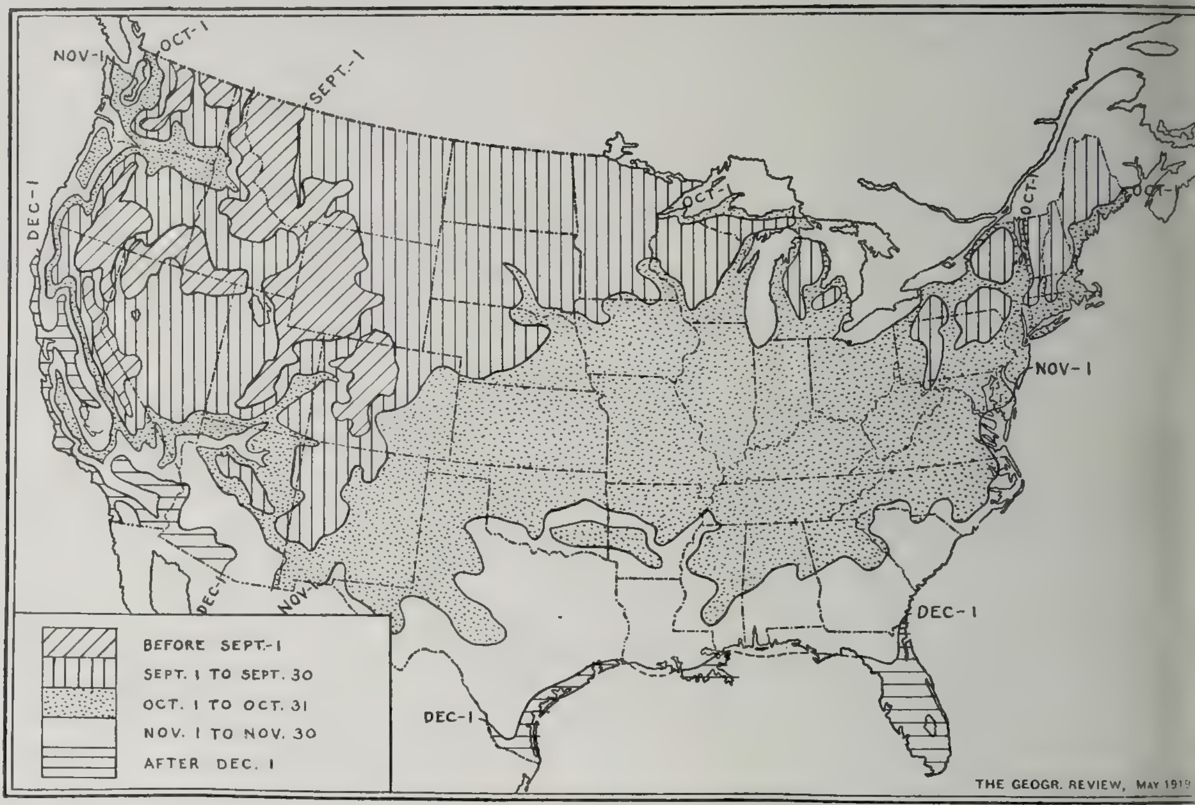


Fig. 2—Map of the United States showing the average dates of the first killing frost in autumn Scale, 1:45,000,000.

immediate coast of the Gulf of Mexico, and that of southern California Killing frost occurs in fewer than half of the winters in southern Florid and in the region around San Diego. Excepting Key West and some o its neighboring keys, frost has occurred in all parts of the United States Over about one-eighth of the country, i. e. along the northern boundar and at the greater elevations in the West, the average date of the last killin frost in spring is after June 1.

Variations in the Dates of Spring Frosts

As indicated above, the actual date of the last killing spring frost i likely to depart very considerably from the average date. Hence the nee of a study of the variations in the dates of spring frosts. This has bee carried out, as fully as is now possible, in the present monograph. A colored map (Fig. 16), based on 700 records, indicates the number o times in the twenty years 1895–1914 that the last killing frost in spring was ten days or more later than the average date. This map, therefore, gives a measure of the variability of the dates of the last killing frost. These variations are, as a rule, smaller near the Atlantic coast and over the strip of country just east of the Rocky Mountains and are greatest to the west of the Rocky Mountains, where the local effects of the varied topography are most marked, and in Florida and along the Gulf Coast. Another map (Fig. 23) shows the dates after which killing frost in spring is likely to occur only one year in ten on the average, i. e. where the chance falls to 10 per cent. In the West, in Florida, and on the Gulf Coast, the chance of killing frost falls to 10 per cent about thirty days later than the average date of the last killing frost in spring.

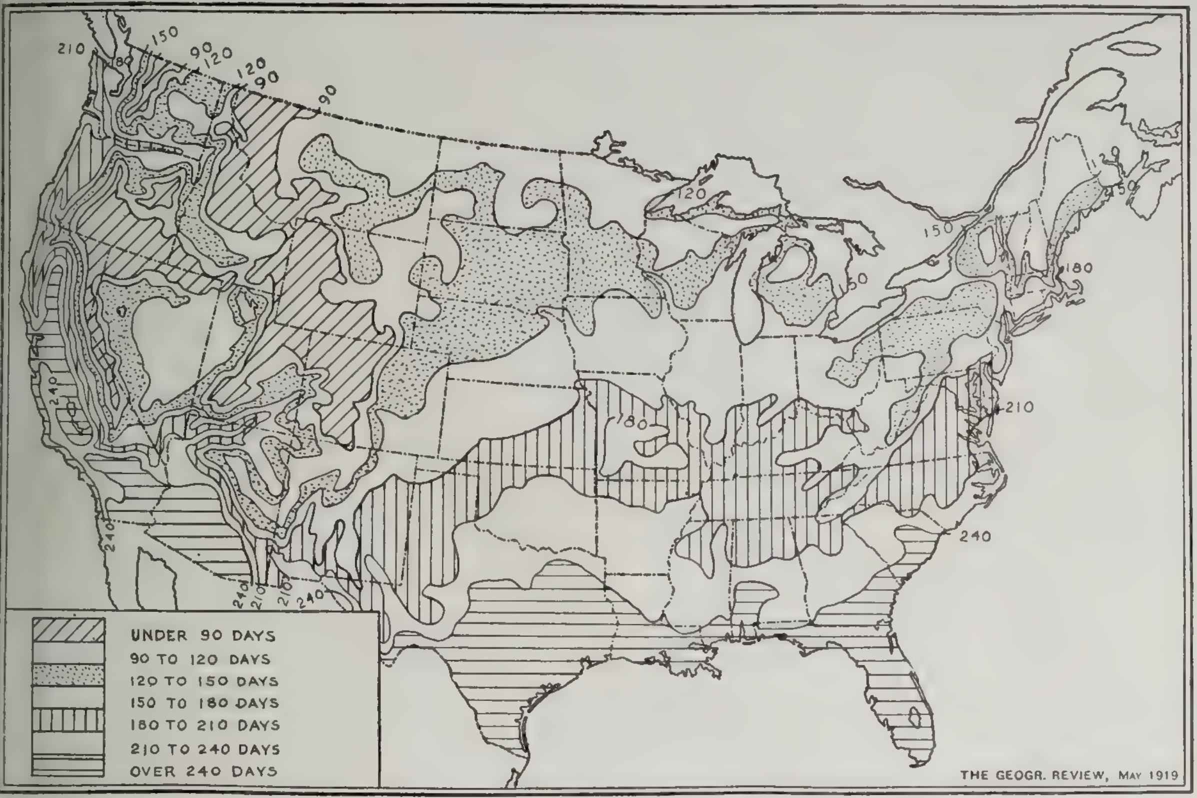


FIG. 3—Map of the United States showing the average length of the growing season. Scale, 1:45,000,000.

THE FIRST KILLING FROST IN AUTUMN

Figure 2 is a simplified and generalized reproduction of Figure 20 in the atlas. It shows the average dates of the first killing frost in the fall. The general similarity between Figures 1 and 2 as here given is easily seen. Thus, the region over which the average dates of the first killing frost are earlier than September 1 is about the same as, though somewhat smaller than, that over which the average dates of the last spring frost are later than June 1. The effects of the Great Lakes in delaying the date of the first killing autumn frost are clearly seen. As in the case of spring frosts, above noted, two maps are given in the atlas which show the variations in the dates of the first autumn frost (Figs. 18 and 26).

Average Length of the Growing Season

Figure 3 is a simplified and generalized reproduction of a double-page colored map (Fig. 29) showing the average length of the period between the average date of the last killing frost in spring (Fig. 3 of the atlas) and the average date of the first killing frost in the fall (Fig. 20). At Key West, Fla., the growing season is 365 days long; in the higher parts of the West it is less than 90 days long. The region with an average period of less than 90 days without killing frost is mostly not available for general farming. Forests are found there when there is sufficient rainfall. The length of the growing season naturally varies considerably from year to year, with the fluctuations in the dates of frost occurrence. Therefore a map has been constructed (Fig. 27) which shows how many times in the twenty years 1895-1914 the season without killing frost was 15 days or more shorter than the average. This indicates the variability of the frostless season in different parts of the country. In this same connection, another map (Fig. 32) shows the approximate length of the season available for the growth of many crops in about four-fifths of the years. This gives, in general, "the number of days expected to be available for the growth of crops in a sufficiently large proportion of the years to enable the organization of farm enterprises on that basis with a reasonable chance of success."

Importance of the Atlas

In the foregoing, reference has been made to some of the more important and most generally useful portions of the new study of frost. Enough has been said to indicate the wealth of detail which is included and to show what a very distinct advance has been made in our understanding of frost conditions in the United States. A comparison of these latest frost maps with the earlier ones referred to at the outset of this review is well worth while as emphasizing the progress made within the last three decades. Mr. Reed's discussion contains numerous other diagrams and maps mention of which is impossible here, and also an excellent bibliography.[4] Throughout the investigation, the needs of the farmers of the country have been kept constantly in mind. The intelligent use of the facts of frost occurrence available in the present monograph will be of the greatest economic value to our agricultural interests.

---

[4] A "Selected Bibliography of Frost in the United States," by W. G. Reed and Cora L. Feldkamp, will be found in the *Monthly Weather Rev.*, Vol. 43, 1915, pp. 512-517. Two additional recent papers by W. G. Reed have been published as follows: Outline for the Study of Frost and Protection against Frost Damage, *Journ. of Geogr.*, Vol. 14, 1915-16, pp. 54-55; Protection from Damage by Frost, *Geogr. Rev.*, Vol. 1, 1916, pp. 110-122. A selection of books and papers bearing on frost forecasting was printed in "Weather Forecasting in the United States," U. S. Weather Bureau, Washington, D. C., 1916, pp. 357-358 (*Weather Bur.* [*Publ.*] *No. 583*). An important study of the occurrence of frost over the earth as a whole is that of Otto Dorscheid: Die mittlere Dauer des Frostes auf der Erde, *Meteorol. Zeitschr.*, Vol. 42, 1907, pp. 11-24, 49-64 (with maps of frost dates).

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Meetings of April. The two last meetings of the American Geographical Society for the season were held on April 8 and April 22 at the Engineering Societies' Building, 29 West Thirty-ninth Street. At both President Greenough presided. At the intermonthly meeting on April 8 Mr. Jerome Davis, recently returned from three years of war work in Russia, gave a lecture on ''The Truth about Russia.'' At the monthly meeting on April 22 Mr. F. W. Hodge, lately of the Bureau of American Ethnology and now of the Museum of the American Indian, Heye Foundation, addressed the Society on ''The Pueblo Indians of the Southwest.'' Prior to the address President Greenough submitted the names of 14 candidates for Fellowship, each of whom had been approved by the Council, and they were confirmed as Fellows of the Society.

NORTH AMERICA

Climate and Crops in the United States. The recent publication of the 'Geography of the World's Agriculture,'' by V. C. Finch and O. E. Baker (Office of Farm Management, U. S. Dept. of Agric., Washington, 1917; see the review in *Journ. of Geogr.*, Jan. 1919, pp. 39-40), and of the forthcoming sections of the new ''Atlas of American Agriculture'' (for sections hitherto published see *Geogr. Rev.*, Vol. 5, 1918, pp. 325-326, and the article on frost above and the note on cotton below, in this ssue) will naturally lead to a revision and amplification of many of the current statements regarding the major geographic controls of crop distribution. The detailed discussion of the influence of the climatic factor upon crops is an especially noteworthy feature of these new publications and will help greatly towards a more thorough understanding of this important relation. Climate is but one of the many controls which determine the present geographical distribution of the staple crops, but it is fundamental.

A paper on ''The Larger Relations of Climate and Crops in the United States'' (*Quart. Journ. Royal Meteorol. Soc.*, Jan. 1919, pp. 1-18), by Professor R. DeC. Ward, gives a summary of the essential facts in these relations, as brought out in the recent publications by the Department of Agriculture. The purpose of the writer is to present a general broad survey, rather than a close study of the many details of the problem. Such details, as he points out, belong to the agricultural meteorologist, whose interest is in the more intricate controls which current and seasonal weather conditions exercise over the quality and the quantity of the crops, rather than to the climatologist or to the general student. As a ''frame-work'' into which these larger facts of climate and crop distribution, and of the various types of farming, may be fitted, Professor Ward adopts the scheme of agricultural provinces suggested in ''A Graphic Summary of American Agriculture'' (by Middleton Smith, O. E. Baker, and R. G. Hainsworth, *Yearbook of Dept. of Agric. for 1915*, Washington, 1916, pp. 329-403; map on p. 335). This is a convenient and logical classification and furnishes a simple and satisfactory working basis for the discussion. The scheme is based primarily upon the distribution of the principal crops and upon the types of farming. The country is divided into two major divisions, separated by the mean annual rainfall line of 20 inches. The eastern half of the country has sufficient rain in normal years and produces annual summer crops cultivated by ordinary farming methods. The western half, with generally inadequate rainfall (except on the North Pacific coast and in parts of California and of the northern Rocky Mountain district), contains only limited areas where ordinary farming of the eastern type may be practiced. In the eastern half, latitude, i. e. temperature, and not altitude, is the dominant control. Hence the agricultural provinces have a general east-and-west extension. In the West, with its high mountain ranges extending n a general north-and-south direction, the agricultural provinces also extend roughly north and south. Rainfall is here the critical factor, and the rainfall is largely determined by the topography. A detailed map of crop distribution in the West is ''patchy,'' he patches usually corresponding to districts of local irrigation.

The fundamental climatic controls are considered in connection with corn; wheat; cotton; oats, barley, and rye; hay, forage, and pasture; tobacco; potatoes and other vegetables; fruits, livestock, and dairying. There are also sections on dry farming, rrigation, and forests, and a concluding brief discussion of crops and business. In connection with the latter subject, Professor Eduard Brückner's striking statement regarding rainfall periodicity and immigration is quoted ("Memorial Vol. Transcontinental Excursion of 1912," Amer. Geogr. Soc., New York, 1915, pp. 125-139). "The stream of immigrants to the United States ebbs and flows with the oscillations of climate, which gives it a rhythmical impulse. And not only is the immigration to the United States controlled by climatic oscillations, but also the settlement of the Far West." A good working bibliography is included in Professor Ward's paper.

Boulder Pavements on the Upper Mackenzie River. Certain physical peculiarities of the upper Mackenzie River are detailed by E. M. Kindle in "Notes on Sedimentation in the Mackenzie River Basin" (*Journ. of Geol.*, Vol. 26, 1918, pp. 341-360). Amongst these is the notable development of boulder pavements. These marvelous pavements, resembling cobblestone roadways, are described as stretching along the river for miles without interruption. They form gently sloping concave banks, in places extending from below low water to a height of 25 feet above it. Their unusual scale is attributable to the abundance of material and the powerful action of the river ice during the spring break-up. The channels of the Slave, the lower Peace and Athabaska Rivers are largely cut in silt deposits, and here boulder pavements are unknown. The channel of the Mackenzie, on the contrary, is cut for the most part in glacial till rich in boulders that the grinding and sliding action of the ice builds into pavements. Of the great destructive and constructive action of the ice in the Mackenzie there is everywhere abundant illustration. An appreciation of its force is gained from the statement that at the Ramparts—the gorge above Fort Good Hope, where the river is narrowed to 500 yards—the ice jam has been known to raise the river 100 feet. Most convincing is the graphic description of the break-up at the junction of the Liard and Mackenzie quoted by Kindle from R. G. McConnell (*Ann. Rept. Geol. Surv. of Canada*, Vol. 4 for 1888-1889, p. 87 D).

Connected with the boulder pavements is another feature wherein the upper Mackenzie contrasts with the streams of the system above Great Slave Lake. Where the Slave and lower Peace pursue a typically meandering course the Mackenzie is relatively direct, the boulder pavements affording an effective protection against excessive cutting at the river bends.

EUROPE

Proposed Trans-Pyrenees Railways. The long-cherished ambition of France and Spain for rail communication over the Pyrenees is gradually nearing realization. Conferences whose purpose is to promote the construction of a series of trans-Pyrenees railways, but whose periodical sessions had been interrupted since 1913, recently were held in San Sebastián, to renew arrangements for completing the work (see *Ibérica*, a weekl periodical published by the Observatorio del Ebro at Tortosa, March 23, 1918, pp. 184 190; November 9, 1918, p. 274; and November 16, 1918, p. 290).

Existing railways, one skirting the western end of the range and the other following close to the Mediterranean coast, have offered entirely inadequate transportation facilities for the greatly increased trade between the two countries in the last few years.

Three new lines are under construction. The easternmost of these will connect Barcelona and Toulouse directly by rail and will run from Ripoll on the Spanish side, up the Fraser, a western tributary of the Ter River, will cross the Col de Tosas to the upper Segre, continue via Puigcerdá, cross the Mediterranean-Atlantic divide at the Col de Puymorens, and descend to Ax-les-Thermes, whence a railroad is in operation to Foix The second will ascend the Segre from Lerida to Balaguer, pass Tremp and Sort on the Noguera Pallaresa, tunneling under the Puerto del Salau to join the French section which is being built up the Salat from St. Girons. These two lines will put the provinces of Catalonia, with their increasingly important manufacturing centers, their productive vineyards, and their still undeveloped mineral riches, into far better land communications with southeastern France, to which a large part of their exports are sent, relieving, too, the congested port of Barcelona, whose harbor facilities have been greatly overtaxed by Catalonia's rapid industrial development in recent years. Another benefit that will accrue from these new rail connections will be the easier movement across the Pyrenees of the laborers from Spain who go in large numbers to the industrial establishments or, seasonally, to aid in the grape harvests of southern France.

The third line referred to will connect Zaragoza with Oloron, via Zuera, Jaca, and Bedous. From the railhead at Jaca it will ascend the Valley of Canfranc and cross the Pyrenees by the Somport Pass (Latin, Summus Portus), 5,355 feet above the sea, famous for the old Roman road which here traversed the range. Thence it descends the Vallé d'Aspe to Oloron. This line will be of double value, serving as a French outlet from the middle valley of the Ebro with its irrigated fruit lands, and, through the valley f the Jalón, offering one of the most practical routes between France and the high-ands of Castile.

A fourth line is under consideration, which it is thought, may prove more suitable s a direct route from Madrid to Paris. This would go from Madrid to Siguenza run-ing almost parallel with the present line to Zaragoza, cross the basin of the Duero to oria, thence to Calahorra (possibly skirting the Sierra de Almuerzo to the eastward in rder to avoid a 1,000 meter tunnel) and Pamplona, reaching, on the French side of the ivide, the valley of the Aldudes by tunneling the summit called Urtiaga. From here the ine would descend to Bayonne or Dax.

Maps in Clément Decomble's ''Les Chemins de Fer Transpyréneens'' (Paris, 1913) how how these several lines will connect with railways already constructed in both ountries. In this volume may be found also a list of works referring to these Trans-yrenees railways and the diplomatic discussions that have centered about them.

AFRICA

An Ethnological Expedition to Uganda. In spite of the numerous works treating f Uganda and its people there is still a large field for careful ethnological studies mong the aboriginal tribes of that region. Since this highland has long been the eeting place of Bantu, Sudanese, Nilotic, and Hamitic races, in their migratory move-ents, and as it still retains elements of almost every tribe in Africa, it offers an un-urpassed opportunity for conducting ethnological investigations: an opportunity, more-ver, which is rapidly passing away, for the primitive culture is gradually being modified y contact with Europeans.

According to a recent announcement in *Man* (April, 1919, pp. 63-64), a scientific xpedition is soon to be made into the territory lying west of the Victoria Nyanza. ev. John Roscoe, for many years a missionary in Uganda and author of two standard orks on the people of this region (''The Baganda,'' London, 1911, and ''The Northern antu,'' London, 1915), will conduct the expedition. Its prime object is to study the arious pastoral tribes who occupy the elevated grasslands between the Victoria Nyanza nd the western Rift Valley, thus extending the investigations already carried on in orthern Uganda by Roscoe, Hobley, and Cunningham and the similar work done in uanda (German East Africa) by Hans Meyer. These pastoral people, represented by ch tribes as the Bahima and the Batusi in the Western Province and by the Baganda bout Mengo near the northern end of Victoria Nyanza, subsist almost entirely on a ilk diet, varied somewhat by flesh from their cattle. They despise agriculture and griculturists. Life centers about the herds, which they keep in great numbers. These erds furnish (besides food) skins for the scanty clothing necessary; hides, which, retched between posts, serve as beds; leather for sandals; thongs for a variety of pur-oses; objects for ceremonial usages; bones for implements; dung for fuel; and even e dowry with which a wife may be bought. The people are expert leather workers. aving little timber for building purposes they are adepts at weaving grass or reeds to mats, doors, walls, and fences.

The proposed expedition will probably spend two years in this ''ranch land of the otectorate,'' entering the territory via the Mombasa railway and Lake Victoria, oving northward toward the Nile country, to return by way of Egypt. The cannibal ibes about Mt. Elgon may also be visited. Funds have been provided by Messrs. R. J. ackie and Co., of Glasgow. A committee representing the Royal Society will have pervision of the work. The plan is largely due to the enthusiastic efforts of Sir James . Frazer, who on other occasions has been a leading spirit in such studies.

ASIA

Variations in the Climate of Ancient Palestine. Professor J. W. Gregory, who s given considerable attention to the subject of climatic ''changes,'' contributes to recent number of the *Quarterly Journal of the Royal Meteorological Society* (Jan., 19) a note on the much-debated question of changes of climate in Palestine.

Professor Gregory does not believe in cyclical variation with a period of a few nturies. His examination (see in general his paper ''Is the Earth Drying Up?'', *ogr. Journ.*, Vol. 48, 1914, pp. 148-172 and 293-318) of the records of Palestine, renaica (see especially *Geogr. Journ.*, Vol. 47, 1916, pp. 321-345), and Greece led to e discovery of nothing definite regarding simultaneous climatic variations in ancient nes around the eastern Mediterranean. The Cyrenaica records indicated that ''any such variation as may have occurred was not sufficient to have affected materially th physical condition of the area or its fauna and flora.'' The meteorological interpr tation of Biblical statements is difficult, and unreliable. It has been pointed out tha Palestine was well watered in the eleventh century B. C., but Professor Gregory remark that that century included David's famine. It has been suggested that the thirteent century B. C. was dry. Yet the well-known incident of the heavy dews on and aroun Gideon's fleece, and the song of Deborah and Barak might be appealed to as eviden of moist conditions. After the Israelites' forty years in the wilderness the impressio that Palestine was a well-watered land in the fifteenth century would be inevitabl In the troublous times of the Judges, the aridity would again be emphasized. ''Ruth famine,'' Professor Gregory points out, ''was in the fourteenth century B. C.; Elijah in the tenth, and Elisha's in the ninth, so there does not appear much room for an great variation in a cycle with a period of a few centuries.'' R. DeC. Ward

The Relation of Forests to Floods in China. China has long been called th land of floods. Destruction and starvation follow in their wake with almost yearl persistency. Only last year China experienced destructive floods in Hunan and number of other provinces, where great sums of money were spent for relief. In 191 the destructive Anhwei flood resulted in the organization of the China Famine Relie Committee. The Canton flood of 1915 gave rise to the establishment of the Bureau o Conservancy Works. Scores of societies have been started at different times to rai funds for flood sufferers. But little has yet been done to control or otherwise chec their destructiveness.

D. Y. Lin, a former graduate of Yale University and at present the leading figu in China in forest conservation, has recently discussed the problems of China's floo in an interesting article in the *Far Eastern Review* (The Relation of Forests to Flood December, 1918, pp. 481-485). He first calls attention to the enormous economic an human loss from floods in China and in a most intelligent and conservative mann discusses the influence of the forest on flood control. China is giving more and mor attention to her imperative forest problems, and the outlook is that forest plantin will soon take a prominent place in making the present waste lands of China of economi value to the country, that they may, in combination with reservoirs, protect again future floods. J. W. Toumey

ECONOMIC GEOGRAPHY

The Climatology of the Cotton Plant. The recent publication of the Sectio on Cotton of the new ''Atlas of American Agriculture'' (Part V, Sec. A, Office of Far Management, U. S. Dept. of Agric., Washington, D. C., issued Dec. 15, 1918) makes possible to understand, more clearly and more thoroughly than heretofore, the exa conditions of weather and of climate in which the cotton of the United States is su cessfully cultivated, as well as the general climatic controls in other countries whe cotton is an important crop. Most of the cotton raised in the Punjab or in Sind grown under irrigation, but nearly all the crop of central India, Bombay, Hyderaba and Madras is ''rain'' cotton, i.e. it is planted during or at the end of the rainy seas and picked in late autumn, winter, or early spring, i.e. in the almost rainless seaso Egyptian cotton is grown under irrigation. The land is usually irrigated before bei plowed and then again at intervals of about a month, or less, until the Nile flood arriv in midsummer. During the highwater period the canals are drained every other wee so that the soil may not become water-logged. The cotton crop of Russia (Turkestan a Transcaucasia) grows in an arid continental climate, with hot summers and cool winte and an annual rainfall, where most of the crop is raised, of 5–15 inches. Irrigation necessary. In Peru the area available for cotton cultivation is practically limited t the narrow coastal valleys which can be irrigated. A comparison of the summer te peratures in various cotton regions of the northern hemisphere shows great similarit the mean July temperatures being between 80° and 90° F. (Fig. 11 of the Atlas). Th rainfall, although it varies greatly in amount at other seasons, is similar in having inches or less in October. Heavy autumn rains interfere with picking and result injury to the quality of the lint.

In the United States the northern boundary of the cotton belt has a mean summ temperature of 77° (Fig. 28). Summer temperatures of 80°–83° are found over t southern portions of the belt and of 95° in the Imperial Valley of California. Ve little cotton is raised where the average length of the growing season (period betwee first and last frosts) is less than 200 days. A frostless season of 260 days, or mor occurs over the southern portion of the cotton belt. The western limit of the cott belt is about on the mean annual isohyetal line of 23 inches, the mean annual precipit ion over the belt as a whole ranging from 23 inches (western Oklahoma and Texas) to 5–60 inches (Fig. 19). Summer brings the most rain (Fig. 17) and autumn the least Fig. 18). The important cotton regions practically all have less than 10 inches in autumn.

Weather conditions, as well as climate, are critical for successful commercial cotton production. A mild spring marked by light and frequent showers; a moderately moist summer, with warm nights as well as warm days; a dry, cool, and prolonged autumn are most favorable. Springs which are too cool retard growth, and those which are too rainy tend to rot the seed or to develop surface rather than deep roots. Rainy weather in May and June also interferes with cultivation. Spring and early summer droughts, on the other hand, frequently kill the young seedlings. A cool, wet May and June, and a hot, dry July and August are the worst conditions. Thundershower type rains, with a succession of several bright and warm days between rains, are ideal. Rainy weather in late August is undesirable, because it retards maturity, interferes with picking, and damages or discolors the exposed fiber, but moderate rain in early September is beneficial in favoring the production of a ''top crop'' of bolls which mature late. Early autumn frost is injurious, killing the ''top crop'' or causing a premature opening of the bolls. This often seriously reduces the yield. The seasonal migration, from south to north, of cotton planting is at the rate of 10 to 20 miles a day. It begins in the south about March 20 and in the north about April 20 and usually takes two to three weeks. Picking begins about August 10 in the southern part of the belt and about September 10 in the northern and is usually completed about December 1 in southern districts and from December 20 to January 1 in the north.

Sea Island cotton needs more atmospheric humidity than does upland cotton. Egyptian cotton, now grown in the Salt River Valley of Arizona, in the Yuma district, and in the Palo Verde Valley on the California side of the Colorado River, needs a hot and dry climate like that of Egypt and is grown entirely under irrigation.

R. DeC. Ward

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

ALASKA

EAKIN, H. M. **The Cosna-Nowitna region, Alaska.** With preface by Alfred H. Brooks. 54 pp.; maps, diagr., ills., index. *U. S. Geol. Survey Bull. 667.* Washington, D. C., 1918.

SMITH, PHILIP S. **The Lake Clark-Central Kuskokwim region, Alaska.** With preface by Alfred H. Brooks. 162 pp.; maps, diagr., ills., index. *U. S. Geol. Survey Bull. 655.* Washington, D. C., 1917.

These reports cover large areas of which very little was known previously; hence more attention than usual is paid to geographic description. Both areas lie in the Alaskan central plateau region and both include portions of the basin of the Kuskokwim, the second great river of Alaska. During Russian occupation a trading post was established on the river at about the 158th meridian, but beyond that point little was known until 1898 when the U. S. Geological Survey carried out an exploration confined practically to the main stream. The reconnaissance work by Smith in 1914 extends southward from the main river to Lake Clark and thus across into the Bristol Bay drainage area, covering an area of 4,800 square miles. The area covered by Eakin, 2,600 square miles, extends from the Yukon southward to include the north fork of the Kuskokwim. Both areas are regions of moderate relief: in the Cosna-Nowitna section the proportions of upland (the elevation of which seldom exceeds 2,000 feet) and lowland are about equal; in the more elevated Lake Clark-Kuskokwim section the proportion of highland is about twice as great as the lowland. Numerous navigable streams make both areas fairly accessible during the summer time. The Kuskokwim at that part of its course touched by the expedition is half a mile wide and deep enough for navigation by river steamers. The climate of interior Alaska is subarctic—the summer is short, warm, and fairly wet; the winter long, cold, and comparatively dry. The annual precipitation probably does not exceed 20 inches. The summer of 1914 would appear to have been unusually cold and rainy in the more southern region—precipitation was recorded on 60 days out of 90, and snow fell in July. The climate of the Cosna-Nowitna region is similar to that of Fairbanks; this fact, in combination with a large proportion of well-drained, loamy soils, suggests that this may be one of most favorable areas for agriculture in interior Alaska. The timber line is at an elevation of about 2,000 feet. Most of the Cosna-Nowitna region is forested; on this expedition the scarcity of grass proved an inconvenience for pack animals. The Lake Clark-Kuskokwim region is not so well forested, the proportion of timbered to untimbered land being about 1 to 2. The larger game does not appear to be as abundant here as in the more northerly region. Population is everywhere scanty. Not more than 100 people for the 5,000 square miles surveyed is the estimate for the Lake Clark-Kuskokwim section, and the Cosna-Nowitna section is described as practically uninhabited during the summer; certain native settlements here, however, appear to have been decimated by measles and other diseases. There is little positive information available as to the mineral resources of either region.

GORDON, G. B. **In the Alaskan wilderness.** 247 pp.; maps, ills. John C. Winston Co., Philadelphia, 1917. 9 x 6.

The regions described in *U. S. Geological Survey Bulletins 655 and 667* (reviewed above) are connected by this account by G. B. Gordon of his expedition undertaken in 1907 for the University Museum of Philadelphia. The author traveled down the Yukon to Tanana, up the Tanana River to Fairbanks, returning via Lake Minchumina, west of Mt. McKinley (Denali), and down the north fork of the Kuskokwim. Naturally the accounts of the natives form the most interesting part of the book. Scantiness of population in the great interior is emphasized. "The central basin, drained by two great river systems, consists of timber land and swamps flanked by hills and mountain ranges, with abundance of game but almost without human inhabitants. Never at any time has the population of that district been very numerous in comparison with its size and esources, and during the last half-century it has dwindled until there is hardly even a emnant left.''

On the Kuskokwim River Indian (Tinneh) and Eskimo (Innuit) have met and ought and to some extent have mingled. Especially noteworthy were the Indians of Sikmiut, near the beginning of the lower, or Eskimo, part of the river. They showed hree distinct physical types—one Indian in feature and stature, a second distinctly Eskimo, and a third of intermediate character. The language was Innuit, and many ultural features showed a blending of the races.

Brooks, A. H. **Mountain exploration in Alaska.** 22 pp.; maps, ills. *Alpina Imericana No. 3.* American Alpine Club, Philadelphia, 1914.

Dall, W. H. **Reminiscences of Alaskan volcanoes.** Ills. *Scientific Monthly,* Vol. , 1918, No. 1, pp. 80-90.

Golder, F. A. **Mining in Alaska before 1867.** *Washington Hist. Quart.,* Vol. 7, 916, No. 3, pp. 233-238. Seattle.

Griggs, R. F. **The eruption of Katmai.** Ills. *Nature,* No. 2547, Vol. 101, 1918, August 22, pp. 497-499.

Griggs, R. F. **The Valley of Ten Thousand Smokes.** Maps, diagr., ills. *Natl. Geogr. Mag.,* Vol. 31, 1917, No. 1, pp. 12-68; Vol. 33, 1918, No. 2, pp. 115-169. [Reports on ield work in 1915 and 1916 for the National Geographic Society in the vicinity of Mount Katmai, Alaska. It will be remembered that Katmai was in eruption in June, 1912, in one of the most gigantic volcanic outbursts ever recorded. It is estimated that five cubic miles of ash and pumice were thrown into the air. The dust of the eruption was probbly distributed world-wide, though it is not scientific to say, without qualification, that t was responsible for the cold wet summer of 1912! The reports are chiefly narrative nd descriptive and are accompanied by exceptionally good photographs.]

Moffit, F. H. **The upper Chitina valley, Alaska.** With a description of the gneous rocks by R. M. Overbeck. 82 pp.; maps, diagrs., ills., index. *U. S. Geol. Survey Bull. 675.* Washington, D. C., 1918. [The Chitina Rover has its source in the high mounains near the international boundary north of Mt. St. Elias.]

—— ***Juneau and vicinity, Alaska.*** Surveyed in 1914-16. 1:24,000. U. S. Geol. Surey, Washington, D. C., 1918.

—— ***Southeast Alaska: Steamer Bay,*** 1:20,000, [*and*] ***Wrangell Harbor and Highfield nchorage,*** 1:10,000. *U. S. Coast & Geodetic Survey Chart No. 8164.* Washington, D. C., Oct., 1918.

—— [***Topographic map of Alaska.***] Sheet: ***Lower Matanuska Valley*** **(602A)**. Surveyed in 1909 and 1913. 1:62,500. U. S. Geol. Survey, Washington, 1918. [The use on his map of gray contours for unsurveyed areas to distinguish them from the surveyed reas, shown in the usual brown contours, is an innovation.]

UNITED STATES

Western States

Bradley, W. W. **California mineral production for 1917.** 179 pp.; maps, diagrs., lls., index. *California State Mining Bur. Bull. No. 83.* Sacramento, 1918. [The county aps show railroads, highways, electric power lines, and altitudes, the last expressed in gures.]

Collier, A. J. **Geology of northeastern Montana.** Pp. 17-39. Maps, diagrs., ills. *U. S. Geol. Survey Professional Paper 120-B.* Washington, D. C., 1918.

Colton, H. S. **The geography of certain ruins near the San Francisco Mounains, Arizona.** Maps, diagrs., ills., bibliogr. *Bull. Geogr. Soc. of Philadelphia,* Vol. 6, 1918, No. 2, pp. 37-60.

Colton, M. R. F., and H. S. Colton. **The little-known small house ruins in the Coconino forest.** Pp. 101-126; maps, diagrs., ills., bibliogr. *Memoirs Amer. Anthrool. Assoc.,* Vol. 5, 1918, No. 4. Lancaster, Pa. [''Result of a survey . . . . . in a limed area east of Flagstaff, Arizona.'']

Dawson, T. F. **The Grand Canyon: An article giving the credit of first traersing the Grand Canyon of the Colorado to James White, a Colorado gold rospector, who it is claimed made the voyage two years previous to the expedion under the direction of Maj. J. W. Powell, in 1869.** 67 pp.; ill. *Senate Doc. No. 2, 65th Congr., 1st Sess.,* Washington, D. C., 1917.

Elrod, M. J. **Some lakes of Glacier National Park.** 29 pp.; map, ills. Department of the Interior, Washington, D. C., 1912. 9 x 6.

Fewkes, J. W. **A prehistoric Mesa Verde pueblo and its people.** Map, diagrs., ills. *Ann. Rept. Smithsonian Inst. for 1916*, pp. 461-488. Washington, D. C., 1917.

Fisher, L. C. **Snowfall on Mount Rainier, Wash.** Diagr., ills. *Monthl Weather Rev.*, Vol. 46, 1918, No. 7, pp. 327-330. Washington, D. C.

Greaves, J. E., and C. T. Hirst. **Composition of the irrigation waters of Utah.** 43 pp.; diagrs. *Utah Agric. College Exper. Sta. Bull. No. 163.* Logan, 1918.

Hallenbeck, Cleve. **Summer types of rainfall in upper Pecos Valley.** Maps diagrs. *Monthly Weather Rev.*, Vol. 45, 1917, No. 5, pp. 209-216. Washington, D. C [A series of curves shows the relative amounts of rainfall and the relative hourly frequency of precipitation at Roswell, New Mex., from the different types of rainstorms This is a distinct contribution to the more detailed study of our rainfall from the human point of view. For man's activities, and his crops, are to a large extent affecte not only by the annual and monthly rainfall amounts but also by the character of th rains. The weather-map conditions of different rainfall types at Roswell are described and the distribution of the rainfall in two typical storms is charted.—R. DeC. W.]

Keyes, C. R. **Lacustral record of past climates.** *Monthly Weather Rev.*, Vol. 46 1918, No. 6, pp. 277-280. Washington, D. C. [The author holds that the desert lake do not record climatic fluctuations; that they are due rather to widely different bu purely physiographic causes. Compare his note in the *Geogr. Rev.*, Vol. 5, 1918, pp 326-327.]

Landes, Henry. **A geographic dictionary of Washington.** 346 pp.; maps diagr. *Washington Geol. Survey Bull. No. 17.* Olympia, 1917. [Includes a section containing general information, a gazetteer of 246 pages, and a table of altitudes. "General Information" contains a specially useful section on climate with comprehensiv tables, one giving frost data and length of the growing season. A list of official reference maps is also included.]

Lee, W. T. **The geologic story of the Rocky Mountain National Park, Colorado.** 89 pp.; maps, diagrs., ills., index. Dept. of the Interior, Washington, D. C. 1917. 9 x 6. [A good example of the excellent work being done by the National Par Service to make known the country's great recreation grounds.]

Lyman, W. D. **The Columbia River: Its history, its myths, its scenery, it commerce.** 3d edit. xxi and 418 pp.; maps, ills., index. G. P. Putnam's Sons, Ne York and London, 1918. $2.50. 8 x 5½. [The first edition, 1909, was reviewed in th *Bull. Amer. Geogr. Soc.*, Vol. 41, 1909, pp. 639-640.]

Merriam, J. C. **Evidence of mammalian palaentology relating to the age o Lake Lahontan.** *Univ. of California Publs. in Geol.*, Vol. 10, 1918, No. 25, pp. 517-52

Millis, H. A. **The Japanese problem in the United States: An investigatio for the Commission on Relations with Japan appointed by the Federal Counci of the Churches of Christ in America.** xxi and 334 pp.; ills. Macmillan Co., Ne York, 1915. $1.50. 7½ x 5½.

Murphy, R. C. **Natural history observations from the Mexican portion of th Colorado Desert.** Map, ills. From *Abstract of Proc. Linnaean Soc. of New York* No. 24-25, 1917, pp. 43-101.

—— **National Parks, General information regarding, season of 1918:** (1) **Yellowstone National Park,** 84 pp.; maps, diagrs., bibliogr.; (2) **Mesa Verde National Park** 55 pp.; maps, ills., bibliogr.; (3) **Yosemite National Park,** 47 pp.; maps, ill., bibliogr. (4) **Sequoia and General Grant National Parks,** 45 pp.; maps, bibliogr.; (5) **Win Cave National Park,** 23 pp.; maps, diagr., bibliogr.; (6) **Glacier National Park,** 7 pp.; maps, diagrs., bibliogr.; (7) **Rocky Mountain National Park,** 33 pp.; maps bibliogr.; (8) **Crater Lake National Park,** 23 pp.; maps, diagr., bibliogr.; (9) **Moun Rainier National Park,** 43 pp.; maps, diagr., ill., bibliogr. Dept. of the Interior Washington, D. C., 1918.

Ramaley, Francis. **Notes on dune vegetation at San Francisco, California** Ills. *Plant World*, Vol. 21, 1918, No. 8, pp. 191-201. Tucson, Ariz.

Rixford, G. P. **Smyrna fig culture.** 48 pp.; ills., bibliogr. *U. S. Dept. of Agric Bull. No. 732* (Contribution from the Bureau of Plant Industry). Washington, D. C. 1918. [The author forecasts that within a few years the dry, warm, comparatively frost less regions in the southwestern United States will supply the American market with this commodity.]

Robbins, W. W. **Native vegetation and climate of Colorado in their relation to agriculture.** 56 pp.; maps, diagrs., ills. *Agric. Exper. Sta. Bull. No. 224.* Fort Collins, Col., 1917.

Roberts, Milnor. **The College of Mines series of ores, coals, and useful rocks of Washington, with manufactured mineral products of the state.** 97 pp.; ills., bibliogr., index. *Bull. Univ. of Washington, Univ. Extension Ser. No. 21 (Gen. Ser. No. 110).* Seattle, 1917.

Shantz, H. L. **Plant succession on abandoned roads in eastern Colorado.** Diagrs., ills. *Journ. of Ecol.,* Vol. 5, 1917, No. 1, pp. 19-42. London.

Shreve, Forrest. **The establishment of desert perennials.** *Journ. of Ecol.,* Vol. 5, 1917, No. 3-4, pp. 210-216. London.

Sudworth, G. B. **Miscellaneous conifers of the Rocky Mountain region.** 45 pp.; maps, ills. *U. S. Dept. of Agric. Bull. No. 680* (Contribution from the Forest Service). Washington, D. C., 1918.

—— ***Idaho, State of.*** 1:500,000. U. S. Geol. Survey, Washington, D. C., 1913. [One of the important series of outline base maps being published by the Survey. Cf. *Bull. Amer. Geogr. Soc.,* Vol. 46, 1914, pp. 713-714.]

—— ***Juan de Fuca, Strait of, Approaches to: Destruction Island to Amphitrite Point.*** [1:175,000.] *U. S. Coast & Geodetic Survey Chart No. 6102.* Washington, D. C., September, 1918.

—— [***Topographic map of the United States.***] Sheets: (1) ***Bliss Ranch,*** (2) ***Denverton,*** (3) ***Honker Bay,*** (4) ***Powell Slough,*** (5) ***Snelling,*** (6) ***Turner Ranch, Cal.,*** 1:31,680; (7) ***Point Reyes,*** (8) ***Point Sur, Cal.,*** 1:62.500; (9) ***Preston, Idaho-Utah,*** 1:125,000; (10) ***Big Hatchet Peak,*** (11) ***Cienega Springs,*** (12) ***Columbus,*** (13) ***Hachita,*** (14) ***Hermanas,*** (15) ***Walnut Wells,*** (16) ***Victorio, N. M.,*** 1:62,500; (17) ***Pelona, N. M.,*** 1:125,000; (18) ***Porcupine Valley, Mont.,*** 1:62,500; (19) ***Kerby, Ore.,*** 1:125,000; (20) ***Troutdale, Ore.,*** 1:62,500; (21) ***Port Angeles, Wash.,*** 1:62,500; (22) ***Como Ridge, Wyo.,*** 1:62,500. U. S. Geol. Survey, Washington, D. C., 1918. [On the Point Reyes, Point Sur, Cal., sheets and Port Angeles, Wash., sheet an innovation is made in the differentiation of wooded areas as (1) woods, (2) woods and brush, and (3) brush.]

SOUTH AMERICA

Ecuador, Peru, Bolivia

Berry, E. W. **Fossil plants from Bolivia and their bearing upon the age of uplift of the eastern Andes.** Map, ills. *Proc. U. S. Natl. Museum,* Vol. 54, 1917, pp. 103-164.

The remarkable facts discussed in this paper should be called to the attention of all geologists and geographers. They indicate that in Bolivia the great ranges of the Andes have been elevated from low altitudes since some time in the Pliocene. Tertiary deposits on the high eastern ranges are found by Berry from the evidence of the flora to be no older than this epoch. These beds now lie from 13,000 to 15,000 feet above the sea in a cold and arid intermontane basin, but the fossil plants which they contain resemble those still living in the Amazonian forest and grew in a warm, humid climate at a low elevation.

The material was collected by Singewald and B. L. Miller in 1915. Their most remarkable discovery, however, was that of a new species of brachiopod in the same series of beds near Potosí. Schuchert assigns to these marine shells a late Tertiary age, either Miocene or Pliocene. This evidence goes beyond even that of the plants in showing that at a time indicated by the plant fossils as not earlier than Pliocene this part of the Cordillera Real was not only low but was actually at and below sea level. In an article still in press at the time Berry further states:

"The geological history of Panama, Peru, Chile, Patagonia, and Graham Land shows widespread submergence in the Pliocene (corresponding to the Bolivia occurrences), namely the Toro limestone in Panama, the Paita stage in Peru, the Coquimbo and Caldera beds in Chile, the Paraná beds in Patagonia, and the so-called Pecten beds of Graham Land. This obviously fits nicely with the Pliocene age of the Potosí beds, and I may say that there is no subjective element in the age determinations of these other Pliocene marine beds in South America since I have not altered their age determination but have taken the latest results of Vaughan, Steinmann, Gunnar-Andersson, etc., for the different regions.''

Let us see how this fossil evidence connects with the physiographic history. Before the last glaciation a period of deep canyon cutting resulted from an uplift which Bowman places as at least 5,000 feet (Isaiah Bowman: The Andes of Southern Peru, New York, 1916, Ch. 11). Previous to this a cycle of erosion, consequent upon earlier uplift, had reached maturity, giving rise to wide, open valleys and long, gentle, waste-clad slopes. Miller and Singewald do not fix the age of the plant and brachiopod beds with respect to these physiographic cycles, but the deposits presumably belong to the Tertiary beds which are known to be older than the mature erosion surfaces described by Bowman. This would mark the mature cycle of erosion as both beginning and reaching its maturity in the Pliocene and the stage of canyon cutting as early and middle Pleistocene.

Such a conclusion, if it be substantiated, tends not only to increase our appreciation of the geological recency and magnitude of great orogenic movements in various other parts of the globe, as well as in the Andes, but is in harmony with a conception of a greater absolute duration of the Pliocene and Pleistocene periods. There has been a growth of geological opinion in this direction for a generation. The Pleistocene was formerly assigned a length of the order of 100,000 years. Now geologists are not startled at a length of 1,000,000 or even 1,500,000 years. But the progress of erosion and of faunal change in the Pliocene implies that it was far longer than the Pleistocene. Physiography and paleontology meet in a striking manner in the history of the Andes, but this dovetailing of the two records clearly needs further study. The fixing of the age of the Tertiary beds by Berry is a most important beginning. Paleontology needs to limit the epochs within which physiographic work must be fitted.

JOSEPH BARRELL

LISSON, C. I. **Ensayo teórico sobre el levantamiento de los Andes Peruanos, y estudio de algunas observaciones geológicas que le son anexas.** (Excursión Universitaria del año 1917.) 36 pp.; map, diagrs., ills. E. R. Villarián, Lima, 1918. 9½ x 6.

LURQUIN, CONSTANT. **Meteorología boliviana.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 704-715. Washington, D. C., 1917.

MANRIQUE, FRANCISCO. **Notas sobre vías de comunicación en la República del Ecuador.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 6, Section 5: Engineering, pp. 42-47. Washington, D. C., 1917.

MEANS, P. A. **A survey of ancient Peruvian art.** Map, ills., bibliogr. *Trans. Connecticut Acad. of Arts and Sci.,* Vol. 21, 1917, pp. 315-442. New Haven. [A scholarly summary of the various ''cultures'' of Peru, concluding with a section on the chronology and dates in early Peruvian art in terms of the dynasties of the ancient rulers. There are a valuable bibliography and a selected list of illustrations.]

EUROPE

BRITISH ISLES

MILL, H. R., AND CARLE SALTER. **On the distribution of rain in space and time over the British Isles during the year 1917 as recorded by more than 5,000 observers in Great Britain and Ireland, and discussed with articles upon various branches of rainfall work.** 240 pp.; maps, diagrs. *British Rainfall,* Vol. 57, 1917. Edward Stanford, Ltd., London, 1918. 8½ x 6.

British Rainfall has now reached its 57th annual issue. It represents an extraordinary achievement in meteorological work—the result of the lifelong labors of the late George J. Symons and, since his death, of the active and most efficient efforts of Dr. H. R. Mill. The volume represents the annual output of that unique and remarkable body of observers known as the British Rainfall Organization, supported by voluntary contributions; enlisting, at present, the willing service of more than 5,000 observers; whose Director is the recognized authority on all matters pertaining to the rainfall of the British Isles.

The present volume was prepared under the unprecedented difficulties of a ''war year''—difficulties of printing and engraving and, inevitably, difficulties arising from the absence, on war service, of several of the most experienced members of the Staff of the Organization. In spite of the war, however, the decrease in number of rainfall records received for publication was less than in 1916. In all, 5,085 complete records appear in the volume. The death, in the war, of Donald S. Salter, who had for several years been in charge of the cartographical work, is referred to by the Director in feeling terms. The valuable services of Mr. Carle Salter have obtained for him the recognition which he well merited. He has been appointed Joint-Director, with Dr. Mill, of the British Rainfall Organization, Dr. Mill "continuing to be responsible personally for the finances." In connection with this last matter it is fair to say that Dr. Mill had to meet, in 1917, a deficit of £90, and we cordially agree with him in believing that "it is not right that a work of national importance, after nearly sixty years of increasing activity, should be in such a state."

British Rainfall is much more than a compilation and tabulation of "dry" rainfall data. It always contains articles on topics of special interest. This year there is a discussion of two daily rainfalls of unprecedented amount. One of these, on June 28, 1917, gave the greatest fall on one day ever observed in any part of the British Isles. The amount was 9.56 inches. The article dealing with this subject is illustrated by a colored folding map (10 miles to the inch). There are also special articles on the snowfall of 1917, by Mr. L. C. W. Bonacina, and on the Diminution of Rainfall with Elevation, by Mr. W. C. Nash.

It is fitting to note that the Symons Memorial Medal for 1918 was awarded by the Royal Meteorological Society to the Director of the British Rainfall Organization, "in recognition of services to meteorological science which were only rendered possible by the unfailing devotion of the permanent staff and the persevering co-operation of generation after generation of voluntary observers." R. DeC. Ward

Adamson, R. S. **On the relationships of some [plant] associations of the southern Pennines.** Diagrs. *Journ. of Ecol.*, Vol. 6, 1918, No. 2, pp. 97-109. London.

Bilham, E. G. **On the variation of underground water-level near a tidal river.** Map, diagrs. *Quart. Journ. Royal Meteorol. Soc.*, No. 187, Vol. 44, 1918, pp. 171-189 (discussion, pp. 186-189). London. [Observations made at Kew Observatory.]

Bilham, E. G. **The diurnal variation of atmospheric pressure at Benson, Oxon., during the year 1915.** Diagrs. *Quart. Journ. Royal Meteorol. Soc.*, No. 183, Vol. 43, 1917, pp. 269-281 (discussion, pp. 279-281). London.

Bonacina, L. C. W. **Inverse weather phenomena.** *Symons's Meteorol. Mag.*, No. 627, Vol. 53, 1918, April, pp. 30-32; No. 628, May, pp. 37-40; No. 629, June, pp. 51-52. London. [Refers only to the climate of the British Isles.]

Bonthron, P. **My holidays on inland waterways: 2,000 miles cruising by motor boat and pleasure skiff on the canals and rivers of Great Britain.** xvii and 186 pp.; map, ills. Thomas Murby & Co., London, 1918(?). 8½ x 5½.

Bryant, W. W. **Abnormal temperature, with special reference to the daily maximum air temperature at Greenwich.** *Quart. Journ. Royal Meteorol. Soc.*, No. 185, Vol. 44, 1918, pp. 23-30 (discussion, pp. 29-30). London. [Definition of the usage of the term "abnormal."]

Cadell, H. M. **Industrial possibilities of the Forth Estuary.** Map, diagr., ill. *Scottish Geogr. Mag.*, Vol. 34, 1918, No. 5, pp. 177-189; No. 6, pp. 201-216.

Clark, J. E., and H. B. Adames. **Report on the phenological observations in the British Islands from December 1914 to November 1915.** Diagr., ill. *Quart. Journ. Royal Meteorol. Soc.*, No. 180, Vol. 42, 1916, pp. 233-265. London. [With an addendum, "Report of the Yield of Farm Crops," by R. H. Hooker, pp. 262-264; and discussion, pp. 264-265.]

Clark, J. E., and H. B. Adames. **Report on the phenological observations in the British Islands, from December 1915 to November 1916.** Map, diagr. *Quart. Journ. Royal Meteorol. Soc.*, No. 183, Vol. 43, 1917, pp. 285-316 (discussion, pp. 314-316).

AFRICA

Sahara, including Egypt

—— **Annual Report, 1915-1916, of the Ministry of Public Works, Egypt.** ix and 87 pp.; map, diagrs., ills. Government Press, Cairo, 1917. 15 piasters. 11 x 7½.

The British engineers, with the characteristics of their countrymen, have done and are doing some of their best work under adverse circumstances. The world war brought about not only in military operations, but in civil affairs as well, a high development of skill and efficiency. Notably is this the case in Egypt, where, under the stress of war conditions, the engineers were called upon to cut down expenditures for construction and maintenance of irrigation works and at the same time to increase the area of land and to secure larger crop production. That this was achieved is shown by the somewhat meager annual report of the Ministry of Public Works which under the controlling staff largely of English engineers continued to modify the geography of the country, extending the cultivated area not only within Lower Egypt but in the hitherto little cultivated Dongola division, south of Egypt proper and lying within the Anglo-Egyptian Sudan; also still further south in the Gezira between the White and Blue Niles above Khartum, where, leading from the Blue Nile at Sennar, a new irrigation scheme has been entered upon.

The great problem is not only that of bringing under cultivation more land to supply the needs of the growing population, but also that of providing more summer water for Egypt proper, where, under the conditions resulting from a stable government, the population has rapidly grown from 7,000,000 to 13,000,000 within the present generation.

Unlike the rivers which furnish water for the arid lands of the United States, the Nile is in flood not during the spring and early summer months, but later in the year. Thus, to maintain crop production during the otherwise favorable season of April-July, it is essential to provide water artificially by what are known as perennial canals. In the old days before the construction of such works the lands either lay desolate until the time of the floods which culminated in September, or such lands as were cultivated must be furnished with a supply lifted by hand, or in some cases by animal power or machines, from the low-lying surface of the great river. Furthermore, if, as occasionally happened, the Nile did not rise to its full normal height and did not fill the flood canals and basins, crop losses ensued and famine spread throughout the land.

All of this has been changed by the works perfected and built by the British, the most striking of which is the Assuan Dam with its reservoir holding back the clear water of the annual floods. Below this are other dams across the river built not for storage but to raise the low level of the Nile to such a height that, although the total supply may be less than usual, the water can be taken out into the high-lying canals and carried to the basins. The most important of these dams are, first, below the Assuan Dam, what is known as the Esna Barrage at the head of the most southerly canal system of Upper Egypt and, next, the Assiut Barrage at the head of the canals covering the country farther north or down stream. Then, at the head of the delta where the Nile divides into its two great branches, are located what are known as the Delta Barrages, whose history has been full of interest to engineers because of the many vicissitudes surrounding their construction, partial abandonment, and final successful rebuilding under British control.

There has been a gradual transformation of methods from the prehistoric one of annually flooding the basins to the perennial irrigation of the present time. This change, while of benefit, has given rise to many difficult problems arising from waterlogged soil, the growth of swamps, and the accumulation of alkali. Drains must be installed to meet these conditions, and a nice balance must be established between the demands for water and the necessity of limiting the supply and of rapidly taking away any excess.

The report for the years 1915-16 shows that, although some of the larger projects have been relegated to the future, yet with diminished expenditures it has been possible to carry on much of the work and maintain the growth of the country, particularly in supplying the summer water needed by cotton and rice and for the sowing of maize.

There was in 1915 an unusual extension of cultivation. Cotton planting, however, was restricted, and the water which would have been used for this purpose permitted the planting of 100,000 acres more of rice than was grown in other years. This, at a minimum value of $50 per acre, represented a value of over $5,000,000. The production of more food is not wholly a matter of water supply; there are involved in it here, as in other countries, the far-reaching and difficult questions of population. While it is necessary to have good soil and an adequate supply of water, yet, unless cultivators are willing to utilize these advantages, the investment may be a failure.

The *fellahin* have for unknown ages herded in cramped villages built on artificial mounds above the reach of the inundations; there are no houses scattered through the cultivated fields, as is the case in Europe and America. One of the changes which is being brought about on the newly cultivated areas is the gradual modification, as far as practicable, of these peasants' methods of life by getting them nearer the cultivated lands and under more sanitary conditions than exist in the crowded disease-breeding ancient towns. This report touches on some of these problems and, while optimistic in spirit, shows that the problems are by no means simple but require for their successful solution skill and experience not merely in handling earth, stone, and iron but also in controlling the less tangible forces of widespread human customs and practices.

F. H. Newell

ASIA

Russian Central Asia

Graham, Stephen. **Through Russian Central Asia.** xii and 298 pp.; map, ills., index. The Macmillan Co., New York, 1916. $2.25. 8½ x 6.

Written in Mr. Graham's best manner but different from his other tramping books. This was his boldest venture, and perhaps few men would care to emulate it. He went by rail from the Caspian Sea to Bokhara, Samarkand, and Tashkent, a little beyond which place he reached the railhead. Then began his long and weary walk through the Land of the Seven Rivers (draining into Lake Balkash from the south) to which thousands of Russian peasants had brought the farming and grazing industries of their old homes. He pushed eastward for months among the Kirghiz and the scattered Russian settlements, till he reached China. A little before his arrival, he had heard of the outbreak of the war.

Vambéry who, over a half century ago, revealed fanatical Bokhara, would today, were he living, see much of the old as well as the new in that famous capital. The people are the most faithful of Mohammedans. They crowd the mosques, fashion their attire and habits upon the injunctions of the Koran, and buy almost no Western commodities, though their wonderful silks, carpets, and pottery are sold in Paris and London. But God willed the change that the Russians brought, and so the Bokharans accept, with smiling tolerance, the Russian street-car line, the Russian banks, moving pictures, and the sewing machine. The city of Samarkand, on the other hand, is completely under Russian influence, and 25,000 Russians live there. Tashkent shows the greatest change of all. It is the capital of Russian Central Asia. The muezzins call to prayer from the towers, but the fine Russian streets, shops, and cathedrals have dwarfed the Oriental aspect of the place. It is permeated with the Russian atmosphere.

When Graham with his knapsack finally took to the road, he found trying conditions. It may be very well to lie down in the open with a waterproof to shed some of the rain, if you know where you can breakfast next morning; but settlements are far apart, and even the Kirghiz may not be seen for days. Some of Mr. Graham's pages are tinged with the discomfort he found; but suffering was not acute, he was plucky and kept on to the end.

There are over 200,000 Russians, half of them Cossacks, in the Seven Rivers Province; also, about a million wandering Kirghiz. The former Russian Government gave the colonists land, loaned them money, remitted taxes for five years, built churches and schools, and helped the pioneers in other ways. The money advanced was to be paid back to the government in ten years. Most of the country is very fertile and all branches of agriculture thrive. That part of Turkestan which includes Bokhara, Samarkand, and Tashkent had not been formally opened to Russian immigration; but thousands of Russians have moved in, as there is great demand, at good wages, for farm laborers and workers on the irrigation projects. Mr. Graham gives many details of Russia's management of its colonial enterprises; and he predicts a great future for the Seven Rivers Province and for the economic development of Turkestan.

Cyrus C. Adams

Bartold, V. V. **Rapport sur une mission scientifique au Turkestan russe en été 1916.** *Bull. Acad. Imp. des Sci.* [*de Pétrograd*], Ser. 6, 1916, No. 14, pp. 1239-1242. [In Russian.]

Friederichsen, Max. **Russisch-Zentralasien.** *Petermanns Mitt.*, Vol. 61, 1915, pp. 428-437 and 466-473. [An excellent summary of the geography of the region, based on the latest sources.]

Farther India, including Burma

Groslier, George. **À l'ombre d'Angkor: Notes et impressions sur les temples inconnus de l'ancien Cambodge.** 190 pp.; map, ills. Augustin Challamel, Paris, 1916. 5 fr. 8 x 6. [The narrative of an archeological journey in Cambodia which the author was commissioned to undertake by the French government. Although this is not the first description of Angkor's remarkable ruins the book makes a strong appeal. Angkor is in the belt of the monsoon rains. River life is highly developed in Cambodia. All the environment of that region favors ease of life, a social condition which in fact the author excels in outlining.]

Harrison, C. W. **The magic of Malaya.** ix and 240 pp.; glossary. John Lane Co., London and New York, 1916. 5s. 7½ x 5.

—— **Kandal (Kompong-Speu), Monographie de la Résidence de.** Maps. *Bull. Soc. des Études Indochinoises de Saigon No. 68*, 1916-17, pp. 213-256. Saigon. [The Residency is an area of 3,500 square miles in the center of Cambodia.]

Le Cadet, G. **Régime pluvométrique de l'Indochine.** 34 pp.; maps, diagrs Observatoire Central de l'Indochine, Phu-Lien, 1916.

Parent, ——. **Monographie de la province de Kompong-Chhnang.** Map. *Bull Soc. des Études Indochinoises de Saigon No. 66,* 1914, pp. 71-120. Saigon.

Scott, George. **The Red Karens.** *Journ. Central Asian Soc.,* Vol. 3, 1916, Parts II-III, pp. 27-39 (discussion pp. 37-39). [London.] ["The country of the Red Karens lies to the south of the Shan States, in the hills east of the Burma districts of Toungoo and Yamèthin."]

Sion, Jules. **La structure et le relief du Tonkin septentrional, d'après les travaux de Mr. Deprat.** *Ann. de Géogr.,* No. 144, Vol. 26, 1917, pp. 439-452.

AUSTRALASIA AND OCEANIA

Melanesia, Micronesia, Polynesia

Biddle, Clement. **Some Pacific Ocean islets appertaining to the United States.** Maps, ills. *Bull. Geogr. Soc. of Philadelphia,* Vol. 16, 1918, No. 3, pp. 92-100.

Blanc, ——. **Les îles Wallis: La dernière acquisition de la France dans le Pacifique.** xii and 222 pp.; map. Perrin et Cie., Paris, 1914. 3 fr. 50. 7½ x 5. [The Wallis Islands (Uvea), lying north of the Tonga Islands, passed under French protection in 1887. In 1913 the king demanded annexation by France, but this has not yet become *fait accompli.*]

Broek, A. J. P. van den. **Das Skelett eines Pĕsĕchĕm: Ein Beitrag zur Anthropologie der Papuaner von Niederländisch Südwest-Neu-Guinea.** Pp. 281-354; diagrs., ills., bibliogr. (Nova Guinea: Résultats de l'Expédition Scientifique Néerlandaise à la Nouvelle-Guinée en 1907 et 1909, sous les Auspices de Dr. H. A. Lorentz, Vol. 7, Ethnographie, Part III.) E. J. Brill, Leiden, 1918.

Brooks, C. E. **The meteorology of Ocean Island during the period 1905-1916.** *Quart. Journ. Royal Meteorol. Soc.,* No. 185, Vol. 44, 1918, pp. 50-53. London. [An island of the Gilbert and Ellice group in 0°52′ S. and 169°36′ E.]

Brown, J. MacMillan. **Raivavai and its statues.** Ills. *Journ. Polynesian Soc.,* Vol. 27, 1918, No. 2, pp. 72-77. New Plymouth, N. Z.

Churchill, William. **Sissano: Movements of migration within and through Melanesia.** 181 pp.; maps, diagrs., index. *Carnegie Inst. Publ. No. 244.* Washington, D. C., 1916. 10 x 7.

Compton, R. H. **New Caledonia and the Isle of Pines.** Ills. *Geogr. Journ.,* Vol. 49, 1917, No. 2, pp. 81-106 (discussion, pp. 103-106). [Cf. description of the island in "Nickel Deposits of the World" (reprint of the Royal Ontario Commission), Ottawa, 1917.]

Crose, W. M. **American Samoa: A general report by the Governor.** 40 pp.; bibliogr. Washington, D. C., 1916.

Daly, R. A. **Thirteen-foot model of the world's most active volcano: Faithful reproduction of the Kilauea district in Hawaii on a scale of 1 – 1500.** Ills. *Scientific American,* Vol. 118, 1918, Feb. 9, pp. 132 and 137-138. [For an article on the same model see the *Review,* Vol. 5, 1918, pp. 38-43.]

Elschner, Carl. **The Leeward Islands of the Hawaiian group: Contributions to the knowledge of the islands of Oceania.** 68 pp.; maps, diagrs., ills. Reprinted from *Sunday Advertiser,* 1915, July 4. Honolulu.

Fornander, Abraham, and T. G. Thrum. **The Hawaiian account of the formation of their islands and origin of their race, with the traditions of their migrations, etc., as gathered from original sources.** (Fornander Collection of Hawaiian Antiquities and Folk-Lore.) *Memoirs Bernice Pauahi Bishop Museum,* Vol. 4, Part III, pp. 436-609. Honolulu, 1917.

Gibbs, L. S. **A contribution to the phytogeography and flora of the Arfak Mountains, etc., Dutch N. W. New Guinea.** iv and 226 pp.; ills., bibliogr., index. Taylor & Francis, London, 1917. 12s. 6d. 10½ x 7. [Problems arising out of the author's work on the vegetation of Mt. Kinabalu, British North Borneo (cf. review in *Geogr. Rev.,* Vol. 1, 1916, p. 162) led to the expedition to the similar mountain region of northwestern Dutch New Guinea. The expedition worked through four main topographic and vegetative zones from the coast to the interior lake basins. The immediate shore line, inundated when the huge surf raised by the north monsoon beats back the waters of the flooded river, is scantily peopled by plants and man. Behind the shore is a low-lying belt of coral limestone showing evidences of recent uplift. It is covered by an unbroken, "steamy" forest, practically uninhabited. Beyond, the foothills and lower ranges of the Arfak Mountains show high forest of secondary associations. At 1,000 feet appear the first native houses and native cultivations. Above 7,000 feet low mountain forest prevails.]

JAGGAR, T. A. **Results of volcano study in Hawaii.** Map, diagrs. *Nature,* No. 2525, Vol. 101, 1918, March 21, pp. 54-57. [Brief review of some of the more important discoveries made during the five years that the Hawaiian Observatory has been in operation.]

JUDD, C. S. **Forestry as applied in Hawaii.** Ills. *Hawaiian Forester and Agriculturist,* Vol. 15, 1918, No. 5, pp. 117-133. Honolulu.

LA PLAGNE, LACAVE. **La Nouvelle-Calédonie.** Map, ills. *Colonies et Marine,* Vol. 2, 1918, No. 8, pp. 254-262. Paris.

MACCAUGHEY, VAUGHAN. **A survey of the Hawaiian coral reefs.** Maps. *Amer. Naturalist,* Nos. 620-621, Vol. 52, 1918, August-September, pp. 409-438.

—— **Papua. Annual report for the year 1916-17.** 76 pp.; map, ills. Parliament of the Commonwealth of Australia, [Melbourne,] 1918. [During the year a good deal of new country was visited. The most important patrol covered a section about Mt. Chapman on the frontier between British and the former German New Guinea.]

PIROUTET, MAURICE. **Les aspects du sol néo-calédonien dans leurs rapports avec la géologie de l'île.** Map. *Ann. de Géogr.,* No. 146, Vol. 27, 1918, pp. 102-114.

POWERS, SIDNEY. **Tectonic lines in the Hawaiian Islands.** Maps, ills. *Bull. Geol. Soc. of America,* Vol. 28, 1917, No. 3, pp. 501-514. [An explanation of the notable alignment and uniform spacing characteristic of the volcanoes of the Hawaiian as of other Pacific island groups.]

RIVERS, W. H. R. **The history of Melanesian society.** (Percy Sladen Trust Expedition to Melanesia.) Vol. 1: xii and 400 pp.; maps, diagrs., ills. Vol. 2: 610 pp.; index. University Press, Cambridge, 1914. $10.50 for 2 vols. 9½ x 6½.

ROCK, J. F., O. BECCARI, A. ZAHLBRUCKNER, U. MARTELLI, H. L. LYON, AND M. A. HOWE. **Palmyra Island, with a description of its flora.** 53 pp.; map, ills. *College of Hawaii Bull. No. 4.* Honolulu, 1916. [Palmyra lies about 1,000 miles south-southwest of Hawaii.]

SKEATS, E. W. **The coral-reef problem and the evidence of the Funafuti borings.** *Amer. Journ. of Sci.,* No. 266, Vol. 45, 1918, February, pp. 81-90. [The author emphasizes the importance of the positive evidence afforded by the Funafuti report (Royal Soc., London, 1904). From the evidence presented therein he concludes that the only tenable hypothesis of origin is the subsidence theory of Darwin.]

THURN, EVERARD IM. **The present state of the Pacific Islands.** *Journ. Royal Soc. of Arts,* No. 3446, Vol. 67, 1918, December 6, pp. 38-45 (discussion, pp. 43-45). London.

WOOD, H. O. **Effects in Mokuaweoweo of the eruption of 1914.** Maps, diagrs., ills. *Amer. Journ. of Sci.,* No. 245, Vol. 41, 1916, pp. 383-408. ["Mokuaweoweo is the summit crater of Mauna Loa."]

WOOD, H. O. **On cyclical variations in eruption at Kilauea.** 59 pp.; diagrs. *2nd Rept. Hawaiian Volcano Observatory of the Massachusetts Inst. of Technology and the Hawaiian Volcano Research Assoc.* Massachusetts Inst. of Technology, Cambridge, 1917.

HUMAN GEOGRAPHY

ANTHROPOLOGY AND ETHNOLOGY

BALCH, E. S., AND E. M. BALCH. **Art and man: Comparative art studies.** 268 pp.; map, ills. Allen, Lane & Scott, Philadelphia, 1918. 10½ x 7.

Modern anthropology is essentially based on comparative studies. In all the avenues of approach to the complex science of man—somatology, linguistics, culture—use of the comparative method has brought most fruitful results. In one phase, however, it has not been adopted—in art. Yet it is here no less desirable. Thus Haddon, writing of course as an anthropologist whose training is primarily zoölogical, says: ''the geographical distribution of art is as yet uninvestigated, but, with careful and capable handling, we may expect it to yield results not less interesting than those of the distribution of animals'' (''Evolution in Art,'' 1895). In indicating the two methods of studying art as the esthetic and the scientific he suggests one of the reasons why so little has been done towards a study of comparative art. This difficulty is voiced by Mr. Balch: ''Comparative art is the study of the relations of the arts of the world and can be advanced only by trained art critics who are also ethnologists.'' But it is rare to find the subjective and the objective viewpoints combined in one individual. Mr. Balch himself does not escape the dominance of the esthetic influence: his analysis is essentially the subjective one of the art critic, but—and here is the interest of his work to the student of the science of man—he does recognize the scope of an objective inquiry. In the chapters on the distribution of art, on local and intrusive arts, and on art and man he suggests lines along which it must proceed. The first of these chapters classifies the world's art, ancient and modern, primitive and highly developed (the connotation is the fine arts in the broadest sense), into art families according to the lines of their development, briefly examining their characteristics and distribution. The question of local and intrusive art is a phase of the great problem of the spread of culture, itself of fundamental significance to the origin and evolution of man. We need, for instance, studies of the fine arts along similar lines to the studies of cultural migrations by the Elliot Smith school. In the case of the fine arts, however, the difficulty of distinguishing the two factors that Haddon terms ''the solidarity of the human race'' and ''ethnic idiosyncrasy'' will be peculiarly great, for art is an exceedingly ancient and universal attribute of man.

Hagar, Stansbury. **The American zodiac.** *Amer. Anthropologist*, Vol. 19, 1917, No. 4, pp. 518-532. Washington, D. C. [The author believes in the existence of a native American zodiac showing such affinities with Oriental zodiacs as suggest pre-Columbian intercommunications between the Old and the New World.]

Humphrey, S. K. **Mankind: Racial values and the racial prospect.** xvi and 223 pp. Charles Scribner's Sons, New York, 1917. $1.50. 8 x 5½.

Weisgerber, H. **Revue d'ethnographie.** *Rev. Gén. des Sci.*, Vol. 29, 1918, Nov. 30, pp. 639-649. [A review of recent progress and the present status of ethnography.]

ANTHROPOGEOGRAPHY

Biermann, Ch. **Le cadre géographique des civilisations.** *Atti X Congr. Internaz. di Geogr., Roma, 1913*, pp. 1047-1072. Reale Società Geografica, Rome, 1915.

Fish, C. R. **The frontier a world problem.** *Wisconsin Mag. of Hist.*, Vol. 1, 1917, No. 2, pp. 121-141. Menasha. [Delivered as the annual address before the State Historical Society of Wisconsin, Oct. 25, 1917.]

Lowie, R. H. **Culture and ethnology.** 189 pp.; bibliogr. Douglas C. McMurtrie, New York, 1917. $1.25. 7½ x 5.

Smith, G. Elliot. **Ships as evidence of the migrations of early culture.** 42 pp.; bibliogr. Reprinted from *Journ. Manchester Egyptian and Oriental Soc.*, 1915-16. University Press, Manchester, 1917. [Abstracted in the *Review*, Vol. 4, 1917, pp. 63-64.]

Teggart, F. J. **The processes of history.** ix and 162 pp. Yale University Press, New Haven, 1918. $1.25. 8 x 5. [Contains a chapter on ''The Geographical Factor in History.'' See review of this book in the *Scottish Geogr. Mag.*, Vol. 34, 1918, p. 429.]

Note

In the review of Professor Morris Jastrow, Jr.'s, ''The War and the Bagdad Railway,'' in the January *Review* (p. 60), the statement was made that the author ''assigns Hittite to the Aryan group of languages and attributes the origin of the people to the steppes of southern Russia without presenting his proofs. The point is of sufficient importance at present to have deserved better support.'' Professor Jastrow calls attention to the fact that the assignment of the Hittite language to the Aryan group was based on the work of an Austrian scholar, Friedrich Hrozny (*Mitt. der Deutschen Orient Gesell. No. 56*, May, 1916), as indicated in a footnote on pp. 154-155 of Professor Jastrow's book.

THE
GEOGRAPHICAL REVIEW

OL. VII JUNE, 1919 NO. 6

FINLAND: THE LAND AND THE PEOPLE*

By ERLAND NORDENSKIÖLD
Göteborg Museum

The Finnish race has been bred in the school of adversity. There is no her civilized race that in its entirety dwells so far north. The climate of inland is severe, the land is poor. Furthermore, the Finns have suffered om the disadvantages of their situation as a small buffer nation. Their untry—128,600 square miles in size, about twice as large as New England—is sandwiched between Scandinavian and Slav peoples, with both f whom the Finns are ethnologically unrelated.

The People

RACIAL DISTRIBUTION

The Finns belong to the Finno-Ugrian stock and are most closely allied the Esthonians and Livonians on the Baltic, more remotely with the inno-Ugrian stocks on the Volga and in the Ural Mountains. From rly times the Finns have formed the great majority of the population of inland: the minority is almost entirely Swedish. In 1910 these two roups formed 99.6 per cent of the total population of 3,115,197, of whom per cent spoke Finnish and 11.6 per cent Swedish.[1] Their geographical istribution is shown on the accompanying map (Fig. 1). In the north the country there is a small number of Lapps—about 1,300. The umber of Russians is also insignificant. In 1900 there were only 5,939 ussians in Finland. During the following years and up to the time of

---

* This article should be compared with "The Finn in America" by Eugene Van Cleef, published in Review, Vol. 6, 1918, pp. 185-214. Mr. Van Cleef institutes a comparison between conditions in Finland d northeastern Minnesota, where the majority of Finns in the United States are to be found EDIT. TE.

[1] "Statistisk Årsbok för Finland, 1917," Helsingfors, 1918. Most of the statistics given in this article taken from this annual. Other data are drawn for the most part from the "Atlas de Finlande," 1910, ol. of maps and 2 vols. of text, Société de Géographie de Finlande, Helsingfors, 1911. A summary of text by J. Poirot, the French translator, appeared in *Ann. de Géogr.*, Vol. 22, 1913, pp. 310-325 and -426.

Copyright, 1919, by the American Geographical Society of New York

the Russian revolution of 1917 their number had increased considerably, owing to the stationing in Finland of large numbers of troops.

Over 3,000,000, or almost the whole population of the country, are Lutheran. Only about 50,000 are Greek Orthodox. These figures show how unwarrantable, from the point of view of ethnology and religion, has been the subjugation of Finland by Russia. As regards culture and tradition this is no less true. The entrance of Finland into the ranks of the free nations should therefore be welcomed by all who cherish the principle of the right of small nations to control their own destinies.

THE SETTLEMENT OF FINLAND

Finland was inhabited as far back as the Stone Age, of which period considerable finds have come to light. It is interesting to note that implements from that time are lacking in a broad belt of coast land, particularly along the Gulf of Bothnia. Here the land is constantly being reclaimed from the sea by a steady elevation. During the last hundred years these coasts have risen from four to five feet, and the movement seems to have been in progress since the Stone Age. That part of the population that lived on the coast, either on the skerries or at the mouths of the rivers, has been constantly compelled to shift quarters as the sea receded, a circumstance that is confirmed by the position of the finds. The oldest types of implements are to be found in the uplands, while the more recent ones occur relatively more frequently at the lower than at the higher levels.

The first settlement of Finland seems to have been effected from two directions, in the southwest from Uppland in Sweden and in the southeast from the districts round Lake Ladoga and Lake Onega. In the southwest there lived, presumably dating from the Stone Age, Scandinavians (Swedes), who were probably far more numerous in Finland than they are today. It is not known with certainty what stock it was that migrated to Finland from the Ladoga and Onega districts. As far back as the Bronze Age, of which period, however, there are few finds in the country, the west of Finland seems to have had a Scandinavian population, the east a non-Germanic stock. Even during the earlier phases of the Iron Age the Scandinavian population in Finland was presumably very considerable. From the beginning of the later Iron Age (700 A. D.) the Finns appear to have been established in the country. Old names became Finnicized, Scandinavian antiquities diminished in number and disappeared. Only in certain parts, particularly on some sections of the coast and on the Åland Islands, did an unmixed Swedish population remain.

RELATIONS WITH SWEDEN AND RUSSIA

In the twelfth and thirteenth centuries the Swedes repeatedly made crusades against Finland and finally conquered the country. It remained a Swedish province until 1809. Many Swedes removed to the coast districts of Finland, especially to Österbotten, fronting on the northern three-quarters of the Gulf of Bothnia. During this period the history of Sweden is the history of Finland too. In common with the Swedes, Finns fought under Gustavus Adolphus and Charles XII.

From Sweden Finland received her religion and her political institutions. The whole country has been leavened with Swedish culture.

By reason of her position as a border province Finland was devastated several times by the Russians, especially in the earlier years of the eighteenth century. In two wars that were disastrous for Sweden parts of Finland were lost to Russia during this century. Finland was finally conquered by Russia during the Napoleonic wars. By the Treaty of Fredrikshamn in 1809 Sweden ceded Finland and the Åland Islands, which were united in a kind of personal union with the Russian Empire, that is as an independent state. Respected at first, this independence has been almost completely suppressed during recent years. Before the declaration of independence in 1917 Finland was all but a Russian province. However, in spite of all attempts at Russification, Finland remained faithful to and developed her Western culture, and her cultural relations with Sweden continued to be very considerable. The cultural influence of Russia on Finland was, on the other hand, practically nil. The threatened invasion of Bolshevism in 1918 was the first occasion in history that an intellectual movement coming from the East was of significance to the Finlanders.

It may be said that the Swedish element was completely dominant in Finland, politically, economically, and culturally, up to the end of last century. Since then the Finnish element, among whom a national consciousness began to develop in the earlier half of the century, has risen to a powerful position. The linguistic struggle in Finland has often been bitter and severe; yet it is noteworthy that the Swedish and Finnish populations have never fought each other with any weapons but the pen. It is also noteworthy that the leaders who have worked for the progress of the Finnish-speaking population towards social and political maturity were Swedes, and that those who have advanced the studies of the Finnish language and literature were also in the first place Swedes. Finland is still a country of Swedish culture, even though the linguistic medium is preponderantly Finnish.

The Swedish weft in the population of Finland is, however, more important than would appear from the present extent of the Swedish language. This is shown by the anthropological investigations made by Westerlund and others in regard to the length of the body, the shape of the skull, etc. The Finnish-speaking inhabitants of southern and western Finland are much closer to the Swedish type in these respects than are the Finns living in the northern and eastern parts of the country. In

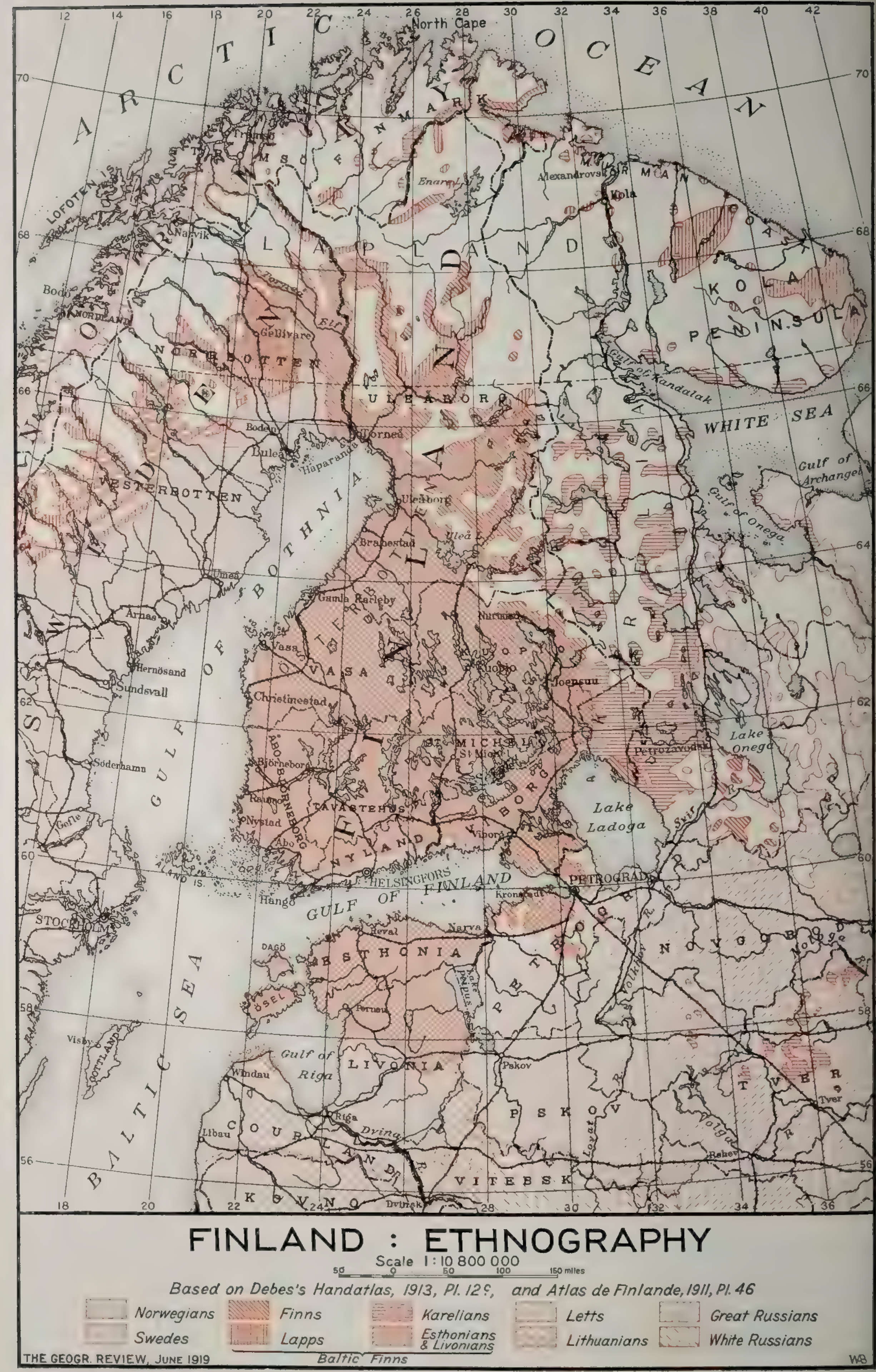
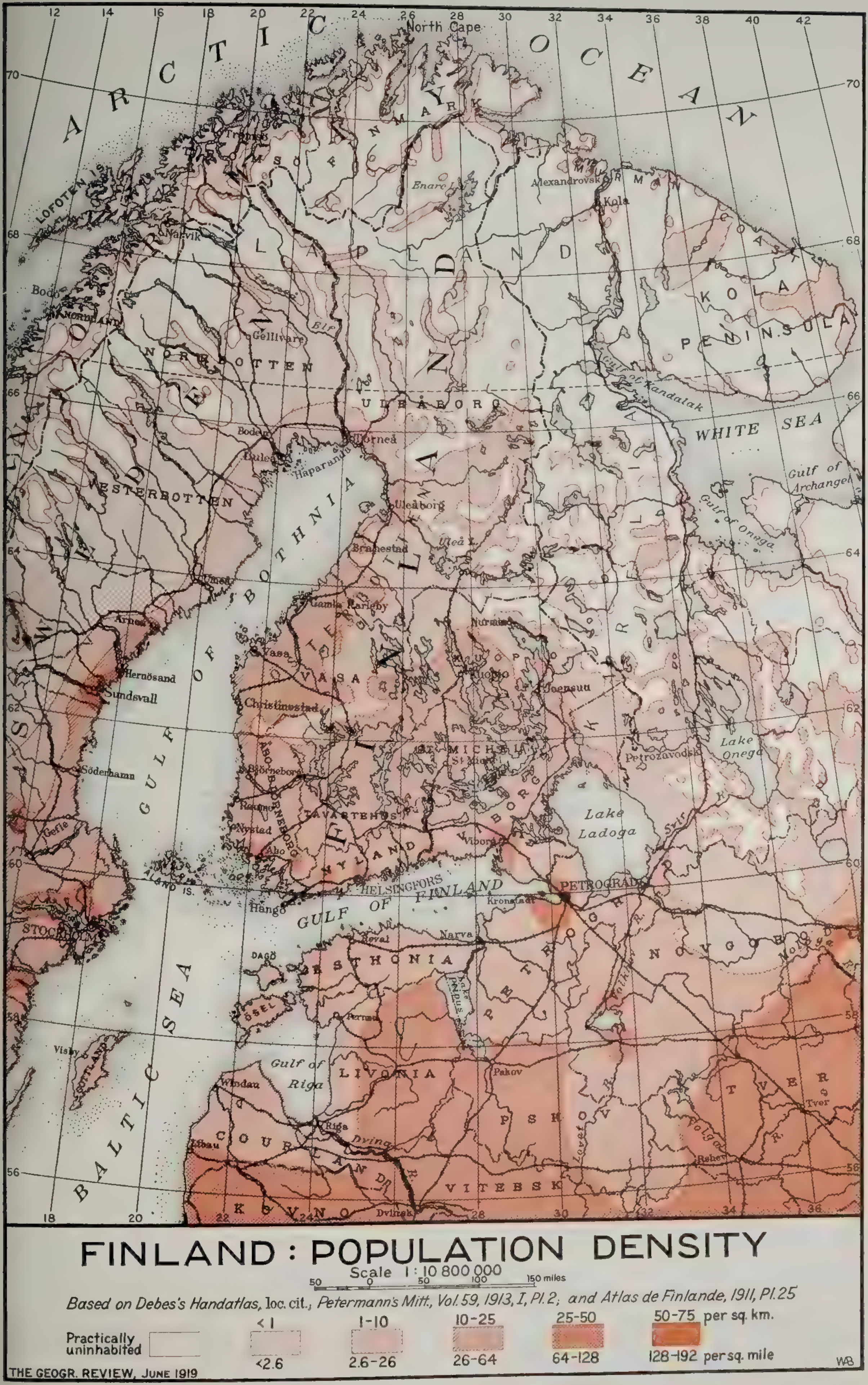

FINLAND : ETHNOGRAPHY
Scale 1:10 800 000
50 0 50 100 150 miles
Based on Debes's Handatlas, 1913, Pl. 129, and Atlas de Finlande, 1911, Pl. 46
Norwegians
Swedes
Finns
Lapps
Karelians
Esthonians & Livonians
Baltic Finns
Letts
Lithuanians
Great Russians
White Russians
THE GEOGR. REVIEW, JUNE 1919
W8
ARCTIC OCEAN
North Cape
FINMARK
TROMSÖ
Tromsö
LOFOTEN IS.
Narvik
Bodö
NORDLAND
LAPLAND
Enare L.
Alexandrovsk
MURMAN COAST
Kola
KOLA PENINSULA
Gulf of Kandalak
WHITE SEA
Gulf of Archangel
Gulf of Onega
NORRBOTTEN
Torneå Elf
Gellivare
ULEÅBORG
Boden
Luleå
Torneå
Haparanda
Uleåborg
Uleå L.
Brahestad
WESTERBOTTEN
Umeå
Arnäs
Hernösand
Sundsvall
Söderhamn
Gefle
NORWAY
SWEDEN
FINLAND
KARELIA
GULF OF BOTHNIA
Gamla Karleby
Vasa
VASA
KUOPIO
Nurmes
Kuopio
Joensuu
Christinestad
ÅBO OCH BJÖRNEBORG
Björneborg
Raumo
Nystad
Åbo
ST MICHEL
St Michel
TAVASTEHUS
NYLAND
VIBORG
Viborg
Lake Ladoga
Lake Onega
Petrozavodsk
Svir
ÅLAND IS.
HELSINGFORS
GULF OF FINLAND
Hangö
Kronstadt
PETROGRAD
STOCKHOLM
Reval
Narva
ESTHONIA
DAGÖ
ÖSEL
Pernau
Lake Peipus
PETROGRAD
NOVGOROD
Volkhov R.
Mologa
BALTIC SEA
GOTLAND
Visby
Gulf of Riga
LIVONIA
Windau
Pskov
PSKOV
TVER
Tver
Volga
Rzhev
Libau
Riga
Dvina
COURLAND
Lovat R.
VITEBSK
KOVNO
Dvinsk
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
70
68
66
64
62
60
58
56

FIG. 1.



FINLAND: POPULATION DENSITY

Scale 1 : 10 800 000

Based on Debes's Handatlas, loc. cit.; Petermann's Mitt., Vol. 59, 1913, I, Pl. 2; and Atlas de Finlande, 1911, Pl. 25

THE GEOGR. REVIEW, JUNE 1919

FIG. 2.

the south and west we find the greatest average height and relatively the greatest number of persons with dolichocephalic skulls. Like the Swedes, most Finns have light or blue eyes. Of the Swedes 52 per cent have blue eyes and 30 per cent light; for the Finns the corresponding figures are 45 and 33.

DISTRIBUTION OF POPULATION

Compared with most countries of Western Europe Finland has a scanty population: the average density is 25 per square mile (see map; Fig. 2). The government of Uleåborg, constituting the northern half of the country, has, because of its greater elevation, colder climate, and scanty resources, only 5 to the square mile. A density of 93 per square mile is found in Nyland, fronting on the western part of the Gulf of Finland, the smallest and the richest of the governments. The detailed distribution of population is interesting. It is beautifully shown in a series of maps on Plate 26 of the "Atlas de Finlande." Just as in the Stone Age, the settlements follow the watercourses, the natural existent means of communication. Even in more thickly inhabited parts the population is scanty away from the watercourses. In the skerries of the southwest and in the maritime district of Saima the great wealth of waterways leads to an even distribution of the dwelling places. In Österbotten, around Åbo, and on the isthmus of Karelia they form, as it were, long narrow strips defining the

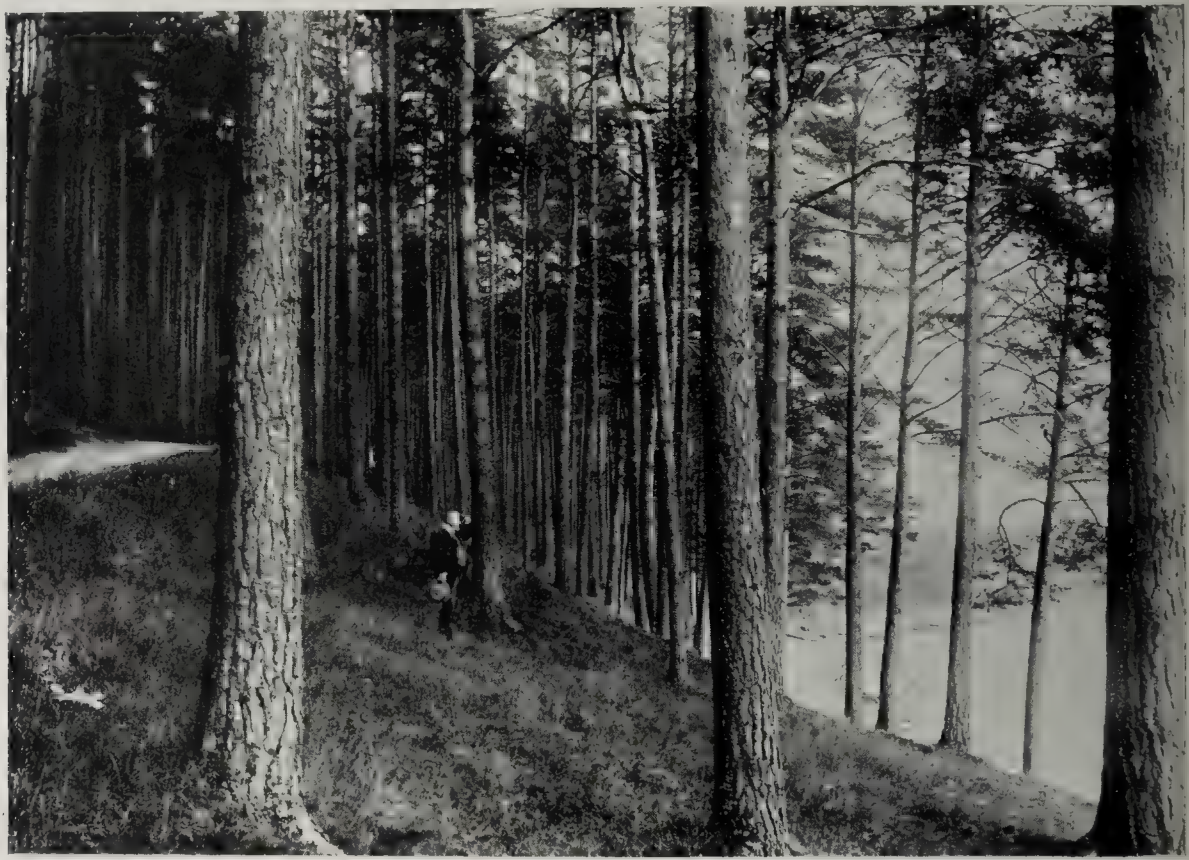


FIG. 3—Pyynikki, a morainic ridge near Tammerfors. Such forested morainic topography is typical of a great part of the country. (Courtesy of Herman Montagu Donner.)

more fertile river valleys. Small as the population is, it has shown a very considerable increase in the last fifty years.[2] From 1865 to 1908 the annual increase has been 1.15 per cent. This increase is accounted for in considerable part by the growth of industrialism. Before 1865 the natural increase was mainly contributed by the agricultural class. In 1900 only one-tenth of the increase in population could be classed as agricultural. The north also has enjoyed a large increase during the last few decades, owing to the work undertaken in the great forests. Growth of the towns has kept pace with industrial development. It has been estimated that 4 per cent lived in towns in 1650, 6.4 per cent in 1850, and 15.5 per cent in 1915. The capital, Helsingfors, had 21,000 people in 1850, 94,000 in 1900, and 176,521 in 1915.

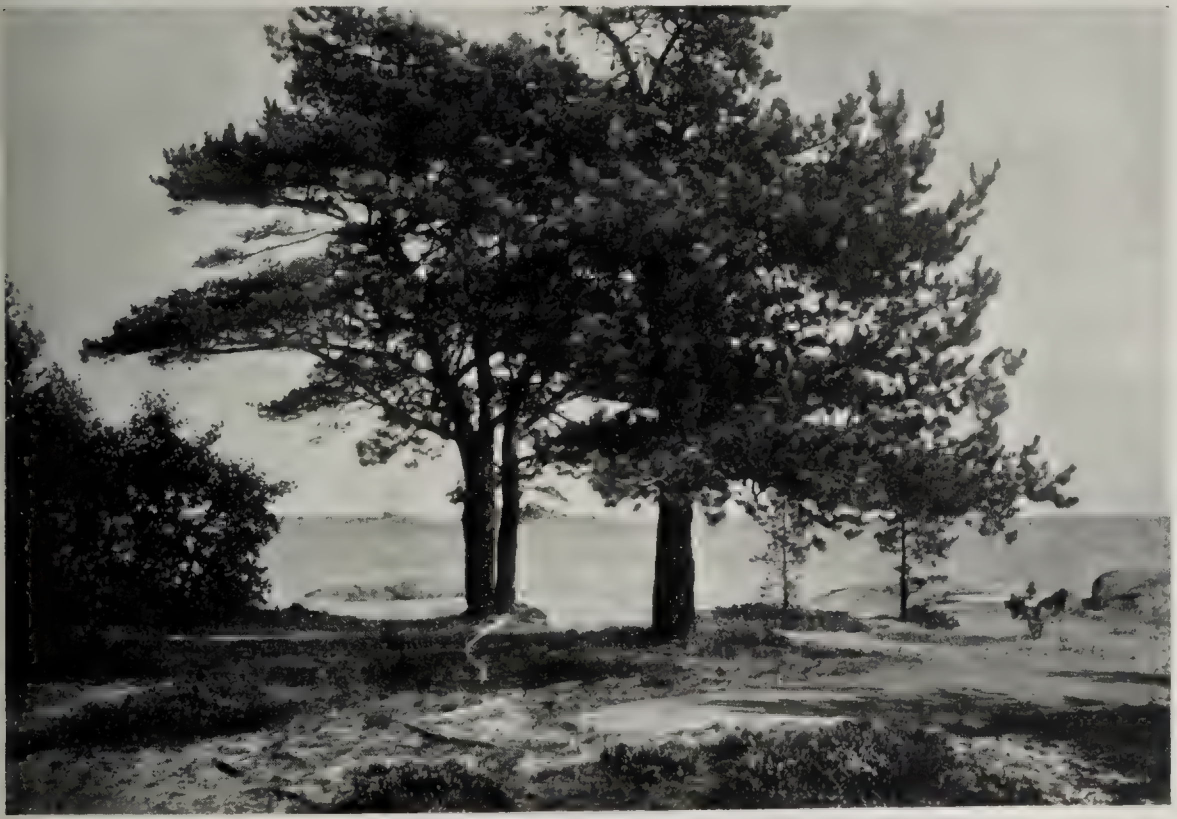


Fig. 4—View seaward from the coast near Hangö. Hangö lies on a sand-covered gneissic peninsula which forms the southwesternmost point of the Finnish mainland and leads over to the island clusters of the skerries.

Emigration

As in Sweden, increase of population has been checked by emigration. This was slight before 1880, but has since increased considerably. In 1902, the record year, 23,152 persons emigrated; from 1893 to 1909 emigrants numbered 119,919 men and 67,963 women. Of these about three-quarters were drawn from the agricultural population, and not less than 25 to 31 per cent were peasant proprietors with their children. A good part of the emigrants were Swedish Finlanders from Österbotten, belonging to the most industrious and capable element in the community. The majority emigrated to North America.[3] A large number of these emigrants left their country on account of the illegal conscription imposed by the Russian authorities. Another reason for emigration lies in the poverty of the country. The proportion of persons engaged in industry is still small, and Finland cannot support its population on its own produce.

---

[2] Sweden, together with Finland, has had reliable population statistics ever since 1749, a distinction to which no other country can lay claim. In 1749 Finland had 534,065 inhabitants; in 1915 there were 3,300,650.

The Land

Finnish Agriculture and Its Basis

The country is a low plateau of crystalline rock exceedingly accidented in detail as a result of glacial action on an already irregular and fractured surface. A morainic mantle covers at least four-fifths of the land. Lakes abound, especially in the eastern part of the country. Most abundantly watered is the administrative district of St. Michel, with 29 per cent of water. In relation to its extent Finland has been estimated to have one-third more inland water than Sweden, three and a half times as much as Norway or Switzerland, ten times as much as Germany, and forty times as much as France. The only region really comparable with Finland in this respect is the Laurentian Plateau, in which are areas with 25 per cent water surface.

It has already been remarked that the climate is severe. Actually in Finland, as in Norway and Sweden, it is not as rigorous as in other countries of the same latitude (approximately 60° to 70°) by reason of the tempering influence of the warm southwesterly winds. Compared with the mean annual temperature prevailing in lands between the 60th and 70th parallels that of Finland is about 6° higher. Naturally the country shows a considerable range of mean annual temperature between its northern and southern limits. While the mean annual temperature at Åbo in the south is about 40° F., in Finnish Lapland it is 27° F. The difference between east and west is also marked: the west on account of its exposure to maritime influence is 3.5° warmer than the east. Sudden changes of temperature are common and, especially in spring and early summer, are likely to be disastrous, the crops over great parts of the country being frequently destroyed by night frosts.

The Crops

In consequence the harvests vary a great deal from one year to another. Crop failures and famines have not been rare. The year 1867 was one of fearful dearth. The rye crop was then less than 2,000,000 hectoliters, whereas a year or two later it was over 4,500,000. In 1889 the potato crop was over 7,000,000 hectoliters; three years later it was below 4,000,000. During the great war, too, the Finns have had a bitter experience of what famine means. Latterly more attention has been given to the cultivation of oats than to that of rye, because of the increased possibilities of importing breadstuffs, and because oats are hardier against frost.

---

[3] See Eugene Van Cleef: The Finn in America, *loc. cit.*

The acreage devoted to oats much exceeds that given to rye, but the oat crop is partly destined for fodder. Rye still remains the principal crop grown for human consumption. It is cultivated up to latitude 64° and in favorable years it ripens up to 67°. Barley is grown up to latitude 68°. This northerly extension of cultivation is in part due to the accumulated temperatures gained in the long daylight periods of summer in this land of the midnight sun. Whereas in the Åland Islands barley takes 116 days to ripen, in the higher latitudes not more than 63 days are counted on between sowing and harvest. Oats are common up to latitude 64°. Wheat is sparsely cultivated, and only in the south. Next to rye, potatoes are the most important foodstuff grown.

Even in normal years the soil does not yield sufficient breadstuffs to support the population. The following table shows the produce of the country compared with the imports between 1896 and 1905.

Agricultural Production and Importation of Finland, 1896–1905

(Amounts in millions of kilograms)

Product	Average Annual Harvest		Imports	
	1896–1900	1901–05	1896–1900	1901–05
Wheat	4.17	3.32	84.19	111.93
Rye	312.78	274.06	244.00	355.07
Barley	110.32	101.35	16.80	19.79
Oats	367.41	297.5	12.15	22.44
Potatoes and other root crops	446.18	517.26	7.34	8.01

In recent years a great deal has been done for the improvement of agriculture. Throughout the farming country there are agricultural schools and colleges. Cattle breeding is of the greatest importance. In 1907 there were 1,100,000 cows in the country (i. e. 374 cows per 1,000 inhabitants). Butter to the amount of 20,000,000 to 30,000,000 pounds is exported annually, chiefly to England, in which country, however, it is known rather as "Danish" than Finnish. In the improvement of butter making a great part has been played by co-operative activity. In 1914 Finland had 395 co-operative dairies.

Half the population of Finland lives by agriculture or cattle raising, but as yet only 8.6 per cent of the land is under cultivation or pasturage. Finland has undoubtedly much cultivable ground which has not yet been utilized. It is estimated that no less than 31 per cent of the land surface is covered by peat bog and marsh. By drainage it would be possible to bring vast districts under the plough.

Furthermore, the distribution of the land in certain parts of the country is not what it might be; large holdings are too numerous and too important, although extremely large estates (*latifundia*) do not exist. Properties with about 2,000 acres of arable land under cultivation are the largest, and even the big landowners practically always live on their estates. Characteristically the Finland of law and order has found its best bulwark against Bolshevism, outside of the educated classes, in the peasant proprietors.

THE NATIONAL RICHES: FORESTS AND FALLS

Climate and soil in Finland are favorable to forest growth, and the country is to a large extent covered with woods, in which pine, fir, and birch predominate. From time immemorial forests have played a great part in the history of the inhabitants. By burning woodland they obtained the ash necessary for fertilizers. For a long time the cultivating of grain was only possible by this process, and even today the same procedure is carried out in the most easterly districts.

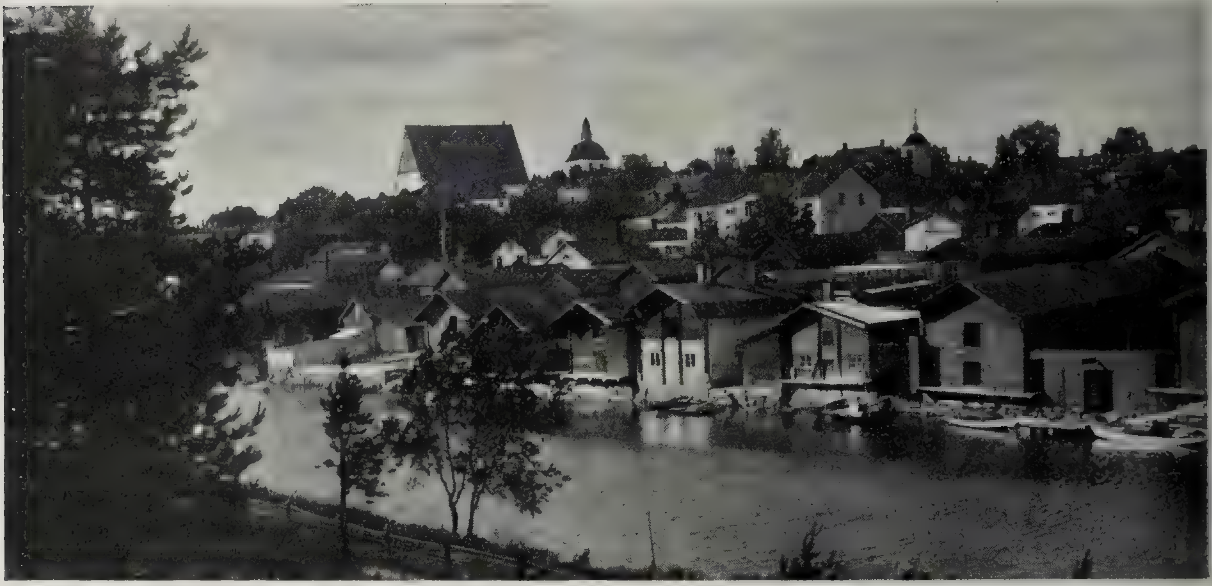


FIG. 5—Borgå, a typical small town in the southern part of the country near the Gulf of Finland.

The chief national riches of the country lie in its forests and waterfalls. From the beginning of the industrial period forest resources have been commercially exploited. Timber exports have given Finland the necessary economic foundation without which transportation and public instruction could not have been developed as they have been during the latter part of the nineteenth century and the beginning of the twentieth. In 1913 wood and wood products formed 75 per cent of the exports of the country, of which the total value was 404,000,000 Finnish marks (francs).

In one industrial factor Finland appears to be deficient. Mineral resources, so far as is known, are inconsiderable. It has been recently stated that the Swedish ore fields in Lapland should have corresponding fields in Finnish territory. Some reconnaissance work has been reported, but as yet one cannot speak of it with authority.

It is Finland's great wealth of water power that gives the country its chief possibilities in industrial development. The hydrographic system of the interior, especially of the Lake Plateau, is exceedingly complex. Characteristically elongated lakes are united by a more or less considerable river, which, before it reaches the sea, flows through a tract of few lakes with a copious wealth of rapids. The largest fall in Finland is Imatra, famous for its natural beauty. Its water power is placed at 80,000 horse power.[4] The total water power of the country is estimated at not quite 3,000,000 horse power, by no means all of which, however, can be used for industry. In 1911 about 100,000 horse power was in use, but this is only a small proportion of what is available.

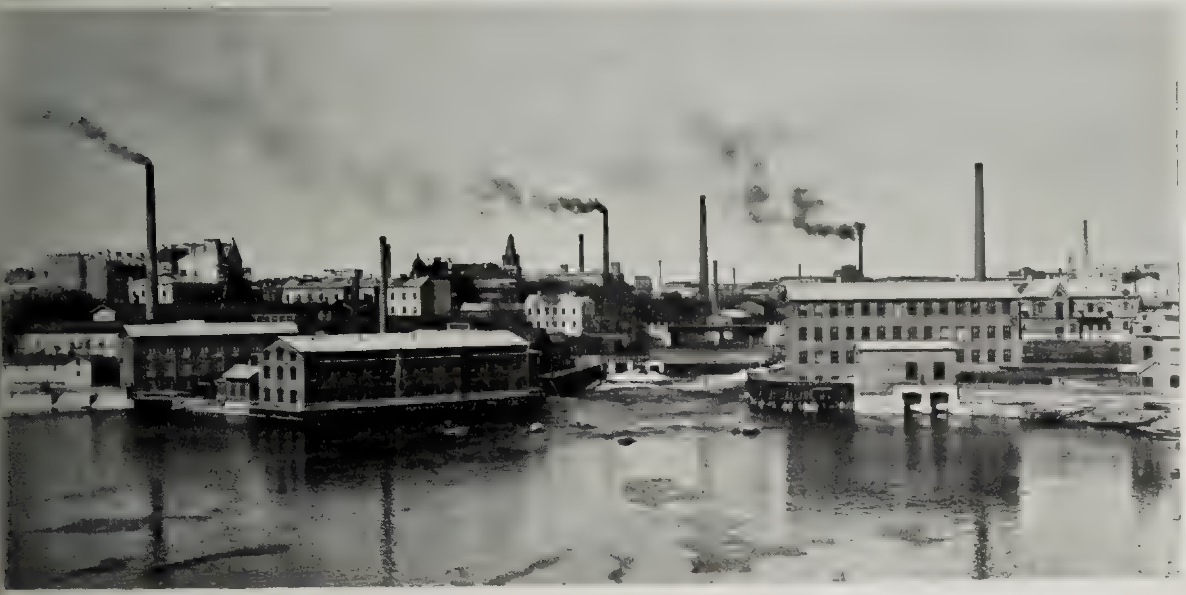


FIG. 6—Tammerfors, the largest manufacturing town in Finland. The town lies on a stream forming the main southwestern outlet of the Finnish Lake Plateau, with a fall of 60 feet in one mile. The waterpower thus generated is utilized by its paper, cotton, and linen mills.

The Vuoksen River, the outlet of the Saima lake basin to Lake Onega, has available 435,000 horse power at low water. But as much of this power now goes to waste as is used in all Finland. Of the power utilized, the greater part (about 80 per cent) is employed by paper works.

The value of the output of the various Finnish industries in 1913 was 50,000,000 Finnish marks. Workmen employed in industry in 1913 numbered 109,238.

COMMUNICATIONS BY LAND AND WATER

The Finlanders have not neglected to use their financial resources, which, in their small way, are good, for the purpose of developing communications and public instruction. Finland has the best highroads of all ountries situated in the same latitude. Whereas in the days of Gustavus Adolphus the roads were like the present roads in northeastern Bolivia,

---

[4] See the note on "The Utilization of Imatra Fall, Finland, for Hydro-Electric Power," *Geogr. Rev.*, ol. 4, 1917, p. 399.—EDIT. NOTE.

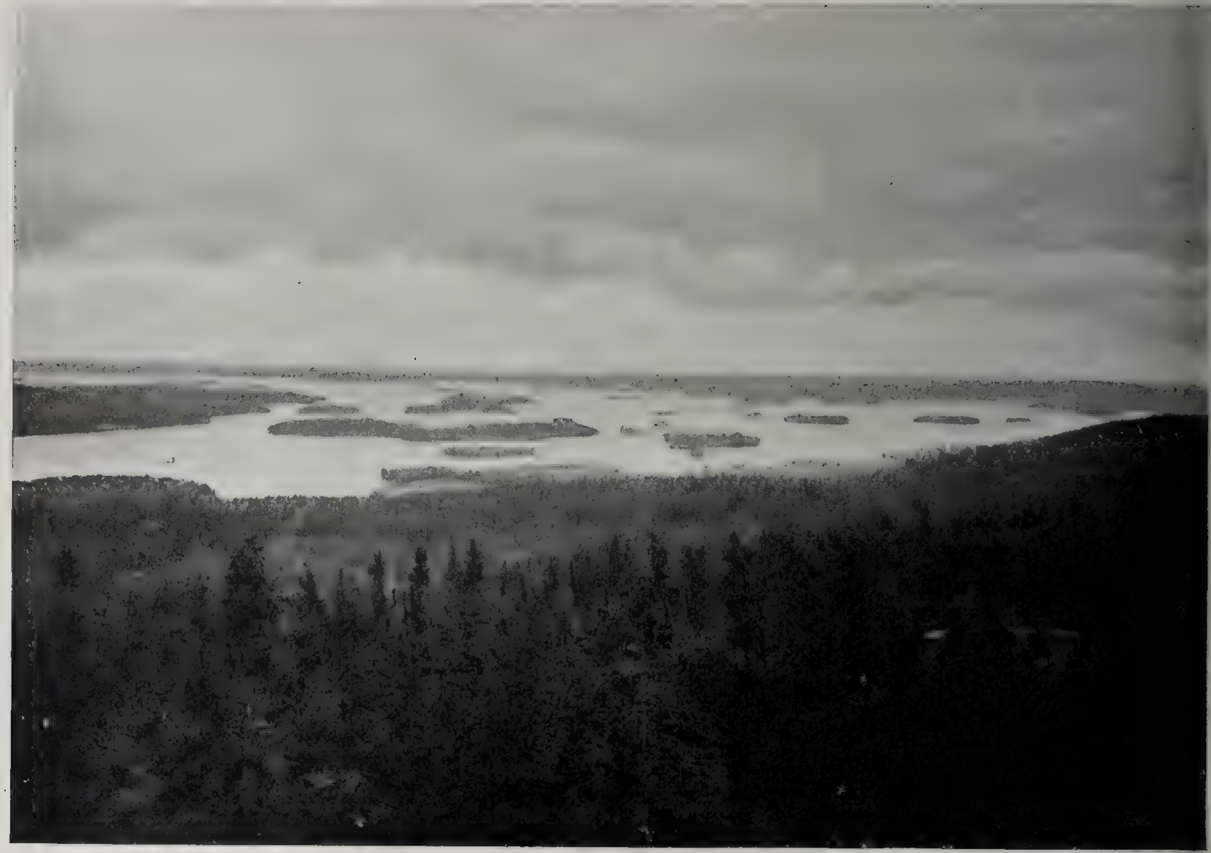


FIG. 7.

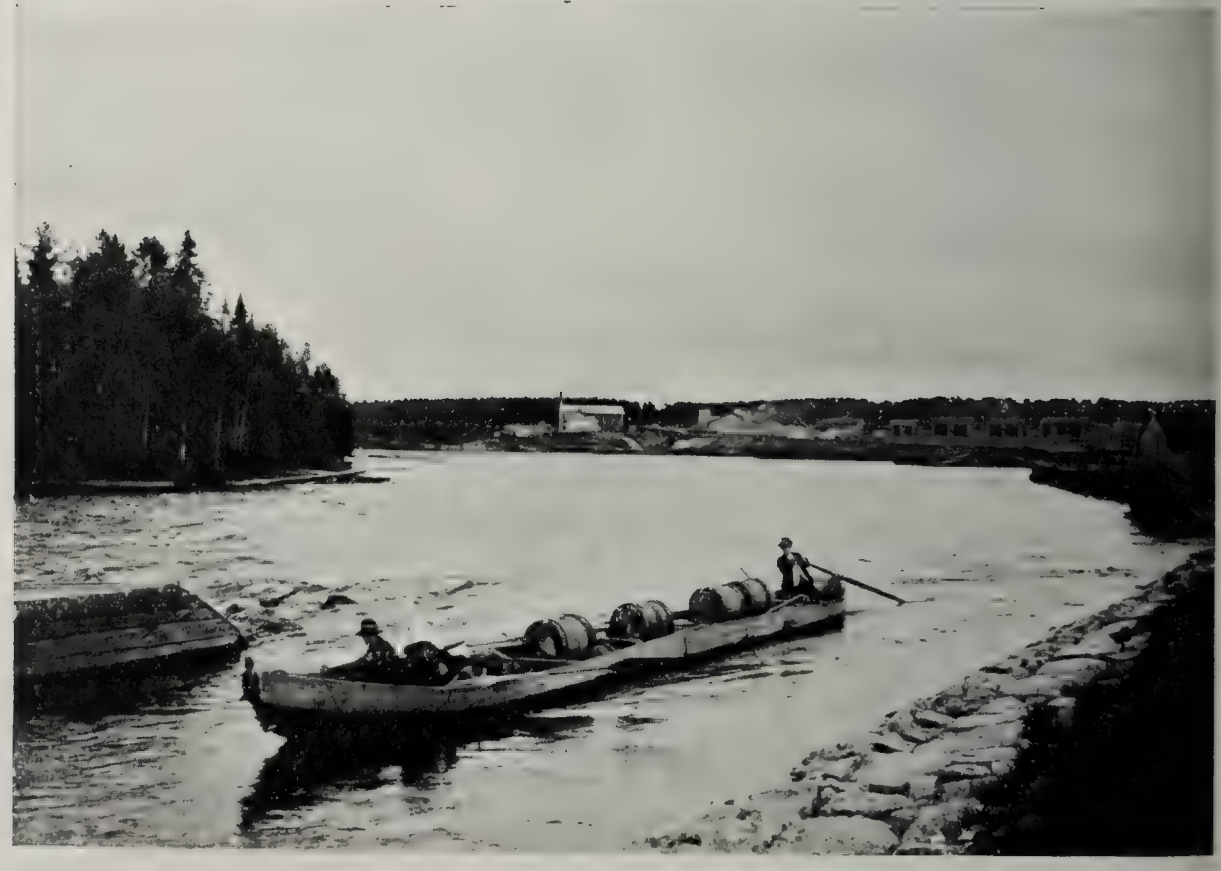


FIG. 8.

FIG. 7—A characteristic view of the Finnish Lake Plateau (in the central part, near Kuopio). Lake Kallavesi in the distance.

FIG. 8—A Finnish inland waterway. In the foreground the canalized portion of the river (above the Koivukoski Falls at Kajana in the northern part of the Lake Plateau).

(Figs. 7 and 8 reprinted from Figs. 36 and 37 in Dominian's "The Frontiers of Language and Nationality in Europe," Amer. Geogr. Soc., New York, 1917.)

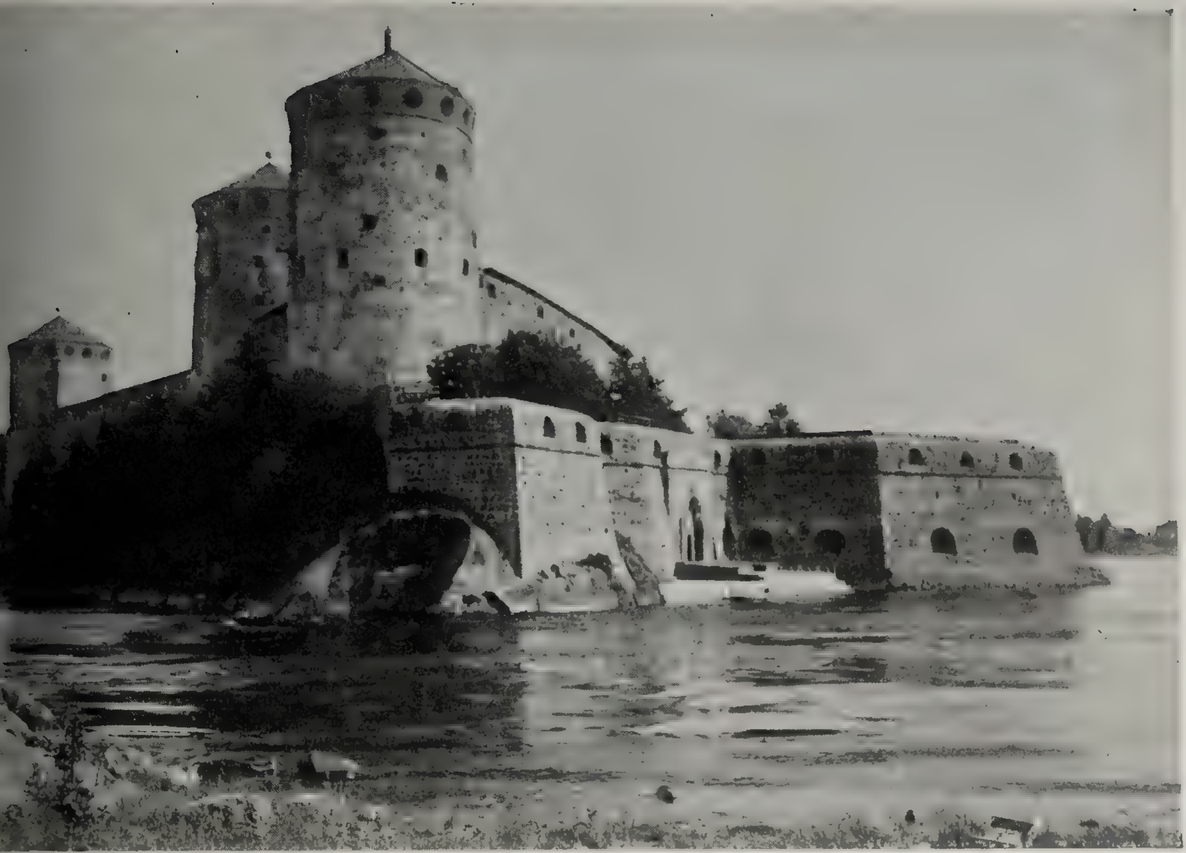


FIG. 9.

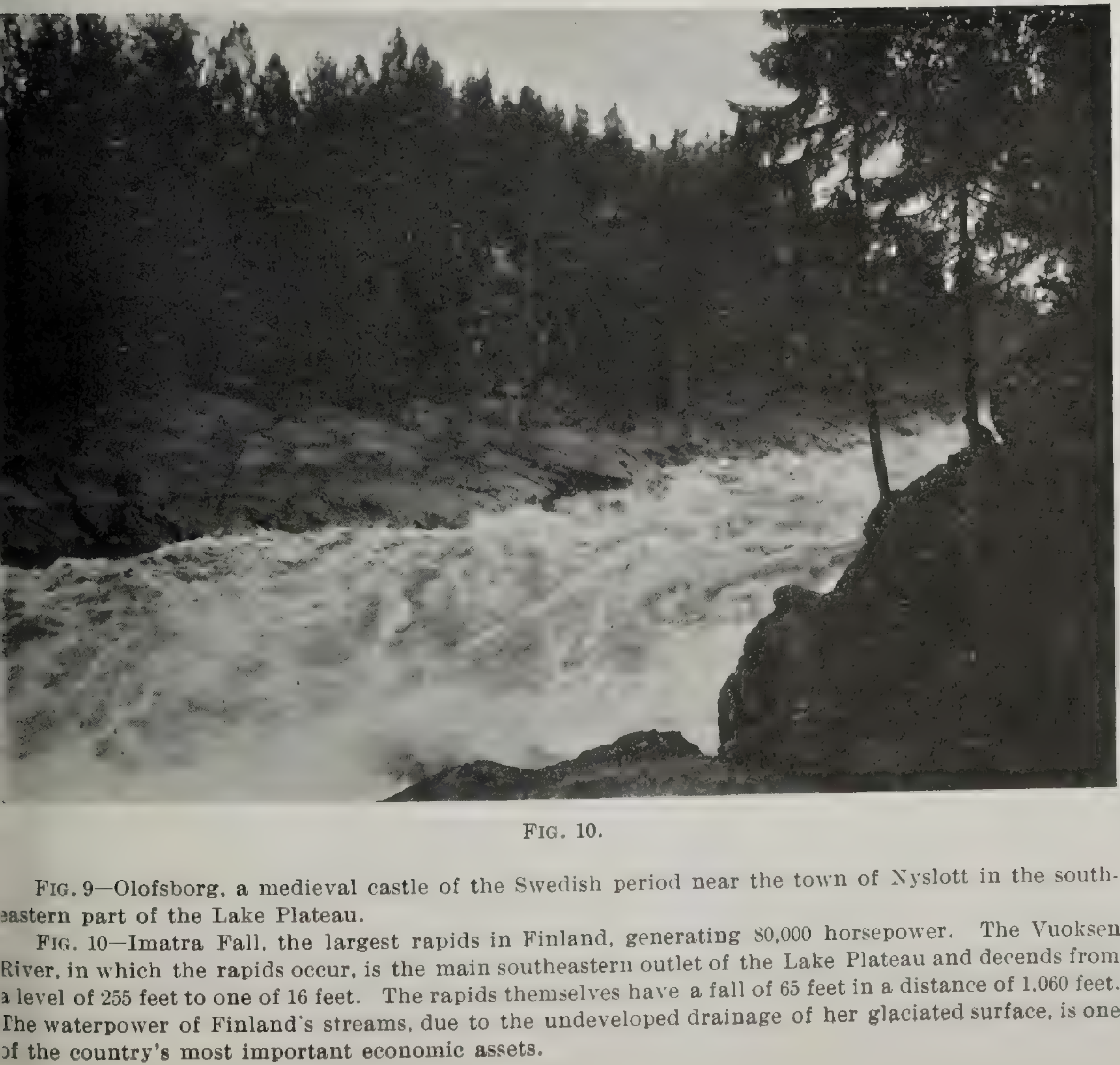


FIG. 10.

FIG. 9—Olofsborg, a medieval castle of the Swedish period near the town of Nyslott in the southeastern part of the Lake Plateau.

FIG. 10—Imatra Fall, the largest rapids in Finland, generating 80,000 horsepower. The Vuoksen River, in which the rapids occur, is the main southeastern outlet of the Lake Plateau and decends from a level of 255 feet to one of 16 feet. The rapids themselves have a fall of 65 feet in a distance of 1,060 feet. The waterpower of Finland's streams, due to the undeveloped drainage of her glaciated surface, is one of the country's most important economic assets.

for example, road making was considerably developed during the latter half of the eighteenth century and still more developed during the last century. The highroads are estimated at nearly 17,000 miles in extent, and the village roads at 10,400 miles. This road building has of course been expensive in so thinly inhabited a country, as experience in pioneer America may well suggest. Characteristic of Finland are the so-called winter roads, which are used when the lakes are frozen over. By traveling partly by land and partly on frozen lakes long detours can be avoided.

The numerous watercourses in Finland have been of extreme importance as highways of communication ever since the Stone Age. For centuries their improvement has been a matter of concern. Certain canals date back to the Middle Ages. The crowning work of improvement, however, is the Saima Canal. The Saima system of lakes, covering 26,000 square miles, 23,200 of which are in Finland, is the greatest in all Europe. Direct connection of this system with the Gulf of Finland, first contemplated in the sixteenth century, was achieved in the middle of the nineteenth. By means of other canals its most distant parts have been rendered easy of access, and it thus affords an outlet of incalculable economic importance for a great part of southeastern Finland. In other systems of lakes, too, canal works have been carried out on a considerable scale.

The first railway for general traffic was opened in Finland in 1862. In 1915 the total railway mileage was 2,500. If we compare the length of the railways with the population of the country, Finland is on a par with such progressive countries as France, Great Britain, and Belgium, and this in spite of the obstacles to railway construction presented by unfavorable topography and climate.

The Finnish mercantile marine consisted in 1914 of 3,384 sailing vessels of 389,758 tons, and 638 steamships of 82,133 tons. Prior to the great war Finnish ships kept up regular communications with Stockholm, Lübeck, Stettin, Copenhagen, Antwerp, Hull, London, Havre, and Bordeaux. They sailed, of course, under the Russian flag, so that their Finnish nationality would hardly be noticed. The long indented seacoast, with its innumerable havens and its fisheries, has naturally bred a race of sailors. Finns are excellent seamen, and many of them serve in foreign navies, where they have the reputation of being capable and honest, though somewhat hot-tempered.

EDUCATION

While Finland still belonged to the great Russian Empire it was unquestionably the part of that domain where most was done for education of all grades.[5] In 1915 there were 3,250 national schools in Finland in the rural districts. All these national schools are mixed schools. In that year, in the rural districts, 51 per cent of all children of school age attended some national school. But the ability to read and write is considerably greater than these figures suggest, owing to widespread home teaching. Practically every Finlander can read, and most of them can write. It is chiefly in the remote, thinly populated parts of the country that the number of children not attending any school is considerable. All children living in towns receive school instruction.

---

[5] See Arthur Reade: Finland and the Finns, New York, 1915, pp. 178-194.

Secondary education in Finland is on the same high level as in the other Scandinavian countries and in Holland. It is of interest to note that during the last few decades the Finnish-speaking element that has had the benefit of secondary education has grown larger and larger. In 1880-1881 pupils in the Swedish-speaking state institutions numbered 1,764; in 1908-1909, 1,771; the corresponding figures in the Finnish-speaking institutions were 786 and 4,756 respectively. In the higher Swedish-speaking state schools for girls there were 784 pupils in 1890-1891 and 1,042 in 1908-1909; the corresponding figures in Finnish-speaking schools were 618 and 2,483.

Finland has now two universities, Helsingfors and Åbo. The former was founded in 1640 in Åbo and was moved to Helsingfors in 1827, when Åbo was burned down. The new University of Åbo, intended only for the Swedish population of the country, was instituted in 1918 with the well-known sociologist, Professor E. Westermarck, as president. At Helsingfors there were 3,435 students in 1915, of whom 799 were women. Standards at the Finnish university are on the same high plane as in the Scandinavian countries. It can boast, among other things, of having produced an incorruptible body of judges. The Scandinavian countries, moreover, have to thank the Finnish medical faculty for the fact that cholera, which appears every summer in Petrograd, has not spread westward. Rabies, which is so common in Russia, is unknown in Sweden, thanks to the hygienic shield Finland forms against the East.

From the University of Helsingfors have also come men whose names are world-renowned, such as Runeberg, the poet; Adolf Nordenskiöld, the first man to sail around Europe and Asia; and Westermarck, the sociologist, author of "The History of Human Marriage."

As is natural, Finnish philologists and ethnologists have concentrated their energies mainly on the Finnish language and Finnish culture in and out of Finland. The impulse was given to the work by Elias Lönnrot's discovery of the great epic of the Finns, the Kalevala, the first version of which was published in 1835. The influence of the great epic as a source of spiritual inspiration to the National movement has been most profound. The folklore material collected in Finland is enormous; in 1907 it embraced 310,000 items—legends, sagas, proverbs, etc.—from the Finnish-speaking population; of the folklore written in Swedish 39,158 items had been recorded up to the same date.

The Future of Finland

The Finns, as has been seen, have a country with a geographical position that in many respects is little to be envied. But the race has striven honestly and patiently to acquire and develop Western culture. If principles of justice win the day in this world, Finland can look forward to a happy future. She has certain boundary questions, though they are not quite as acute as those of most of the other newly freed nationalities of Europe. The eastern boundary is unfortunately not ethnologically correct. A considerable part of what is still Russian Karelia is inhabited by Finns (see Fig. 1), who have shown strong sympathies for union with Finland especially in quite recent days.[6] On the other hand, the purely Swedish population on the Åland Islands has been practically unanimous in desiring to be reunited to Sweden.

Once again it may be emphasized that Finland is permeated with Swedish culture. The majority of the leading men still have Swedish as their native tongue. Mannerheim, to quote but one example, the regent whose sympathies are so strongly with the Entente Powers, is a Swedish Finlander. Yet the Finnish element is coming more and more to the front, a fact that is not surprising when we remember that it forms the predominant majority of the population and that, in cultural respects, it is on a level with the Swedo-Finnish element. It is to be hoped that this Finnish element will go on adding to the edifice of culture which has been building for centuries, despite frost and famine and the ever-threatening trouble from the East. It is likewise to be hoped that in the days to come Finland will know how to apply to the minority within the confines of the country the principle that it claims should be applied to their country in its entirety, viz. the right for small peoples to live their own life. In a broad sense Finland is the outpost of civilization against the East, for Scandinavia, and thereby for the West.

---

[6] Russian, or Eastern, Karelia embraces a belt of land 60 to 150 miles wide extending from Lake Ladoga to the White Sea. It belongs to the geological and botanical province known as Fenno-Scandia (Scandinavia without Scania, Finland, Russian Karelia, and the peninsula of Kola). A heavily forested land, it has been very isolated. This condition of economic backwardness has, however, been removed by the construction of the Murman railroad, which runs through the territory (see "Russia's War-Time Outlets to the Sea," with map, 1:24,500,000, *Geogr. Rev.*, Vol. 1, 1916, pp. 128-132). About half the population is of Finnish stock, the Finnish element especially predominating in the western part of the region. The Karelians live under primitive conditions, and such modern civilization as exists is Russian in character. The region has never belonged to Finland or Sweden, and its outlook is toward the East, whereas that of Finland is toward the West.—Edit. Note.

THE TIOGA ROAD ACROSS THE SIERRA NEVADA

By CHARLES J. BELDEN

The remarkable system of wide, well-graded Alpine highways of Europe and particularly those of Switzerland and Italy, afford ample suggestion that we also should pay attention to the conservation and utilization of natural scenic attractions along our own mountain roads. Threading back

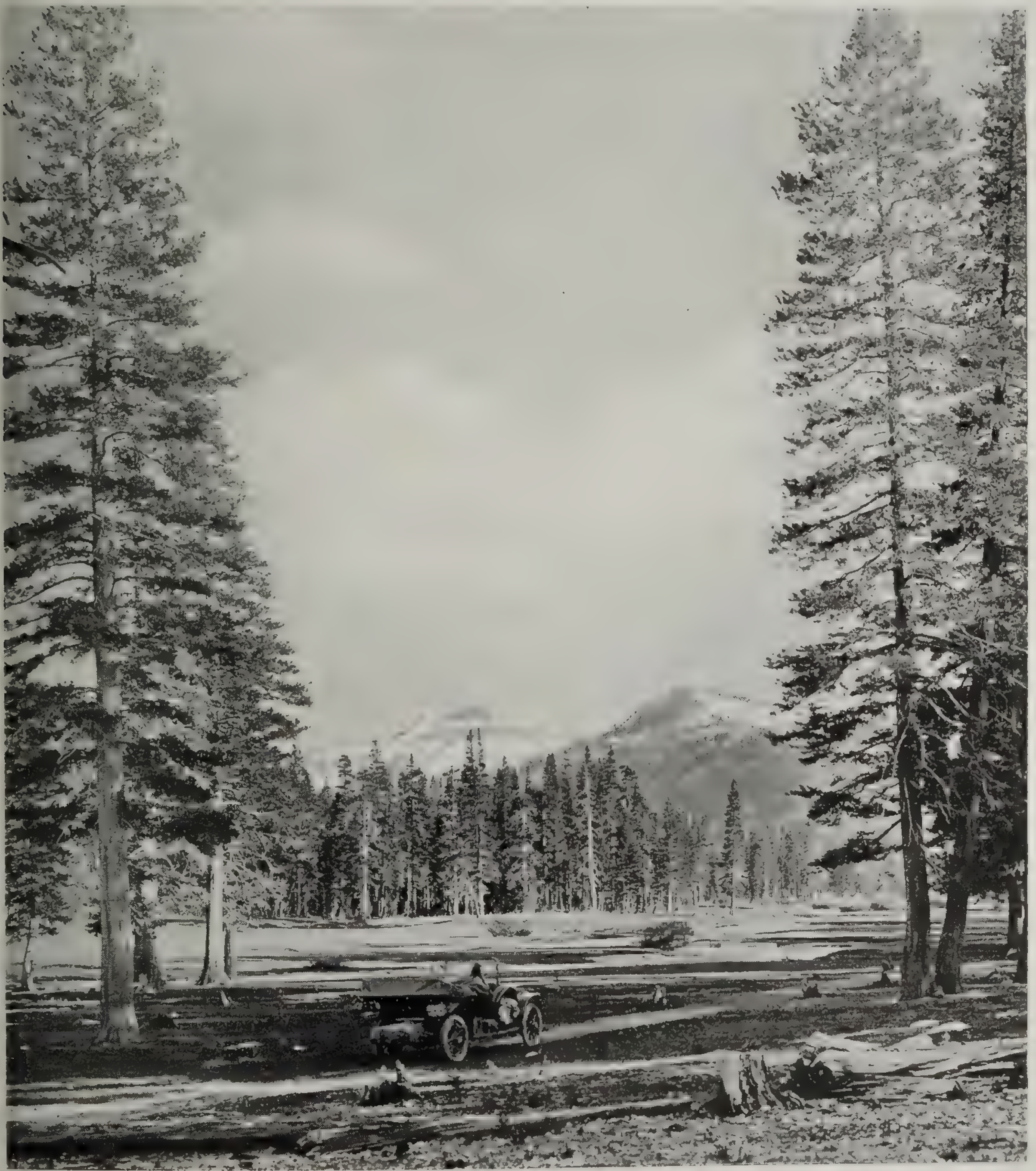


FIG. 1—On the Tioga Road: An alpine meadow nestling close under snow-capped peaks. (All photos by the author.)

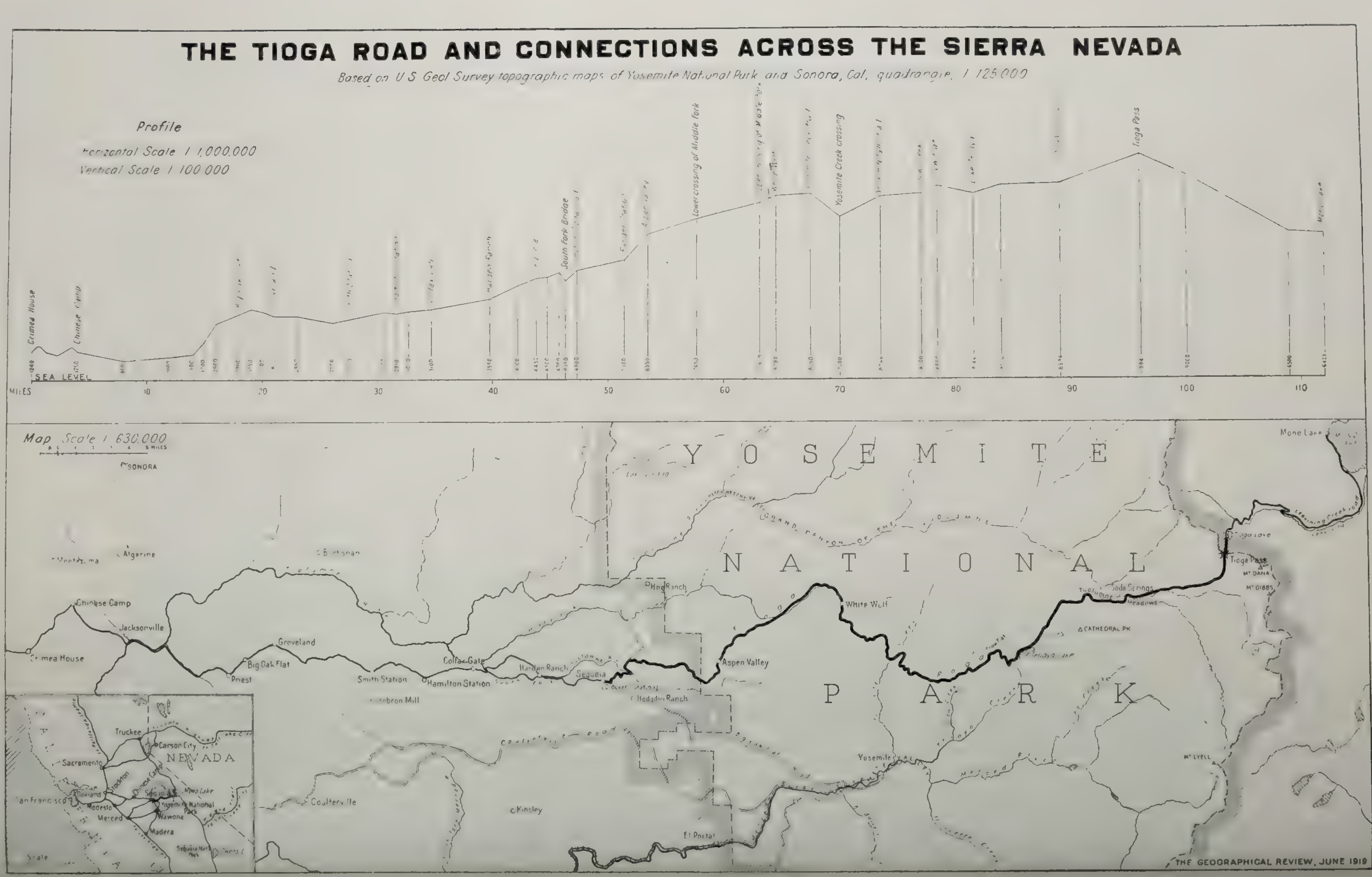


FIG. 2—Map (scale, 1:630,000) and profile (horizontal, 1:1,000,000; vertical, 1:100,000) of the Tioga Road and connections across the Sierra Nevada.

and forth across the snow-capped Alps, these substantially built roads have given enjoyment to countless millions of travelers from all parts of the globe. In time of war these same roads have been of inestimable value in transferring armies and supplies quickly and efficiently and have proved their value many times over.

THE TIOGA ROAD

In our own country the roads that penetrate regions of scenic grandeur are not widely known and are not sought after as travelers seek the St. Gotthard or the Stelvio roads, often journeying thousands of miles for the privilege of traversing these and other equally famous mountain routes. Crossing the Sierra Nevada Mountains just to the north of Yosemite Valley is a road recently opened to the public for general travel that bids fair to attain some day a world-wide reputation. The Tioga Road, as it is called, penetrates the most superb of the scenic grandeurs of the Sierras and offers to the gaze of the wayfarer an array of rugged granite peaks that would satisfy the most *blasé* alpinist.[1]

ITS CONSTRUCTION AND HISTORY

The Tioga Road was constructed in 1882 by the Great Sierra Silver Mining Company for the purpose of transporting supplies to their mine in the very summit of the Sierras, and it has had a rather romantic and variegated history. The name ''Tioga'' was taken from Tioga County in New York, the home of the man who located the mine. The road was skillfully laid out, the construction being of a character unusually permanent for mountain roads in California. The bridges were all put in with fine stone abutments, and retaining walls were built wherever there was the least necessity for them. The surfacing of the road was exceedingly good, and altogether the original builders spared no expense to make this a model mountain thoroughfare. Chinese labor was used to a large extent, and the entire cost was very close to $61,000, or approximately $1,000 a mile.

The road had barely reached completion when the mine proved to be a losing venture and was abandoned. Almost $1,000,000 was spent in this undertaking, which only added another chapter to the history of the many financial tragedies of Western mining.

---

[1] References to the Tioga Road will be found in the following official publications:

General Information Regarding Yosemite National Park: Season of 1918. 47 pp.; with automobile map of the park, 1:375,000, and tables of distances. National Park Service, U. S. Dept. of the Interior, Washington, D. C., 1918. Reference on p. 8.

[Second Annual] Report of the Director of the National Park Service for the Fiscal Year Ended June 30, 1918. 284 pp. U. S. Dept. of the Interior, Washington, D. C., 1918. Reference on pp. 47-48.

R. S. Yard: The National Parks Portfolio. 11 Sections of views. National Park Service, U. S. Dept. of the Interior, Washington, D. C., 2nd edition, 1917. Reference in Section on Yosemite, pp. 16-17.

As to maps see—

Topographic Map of Yosemite National Park. 1:125,000. Contour interval, 100 ft. U. S. Geol. Survey, Washington, D. C., 1915.

Panoramic View of Yosemite National Park. 1:190,000. U. S. Dept. of the Interior, Washington, D. C. [Map in realistic coloring.]—EDIT. NOTE.

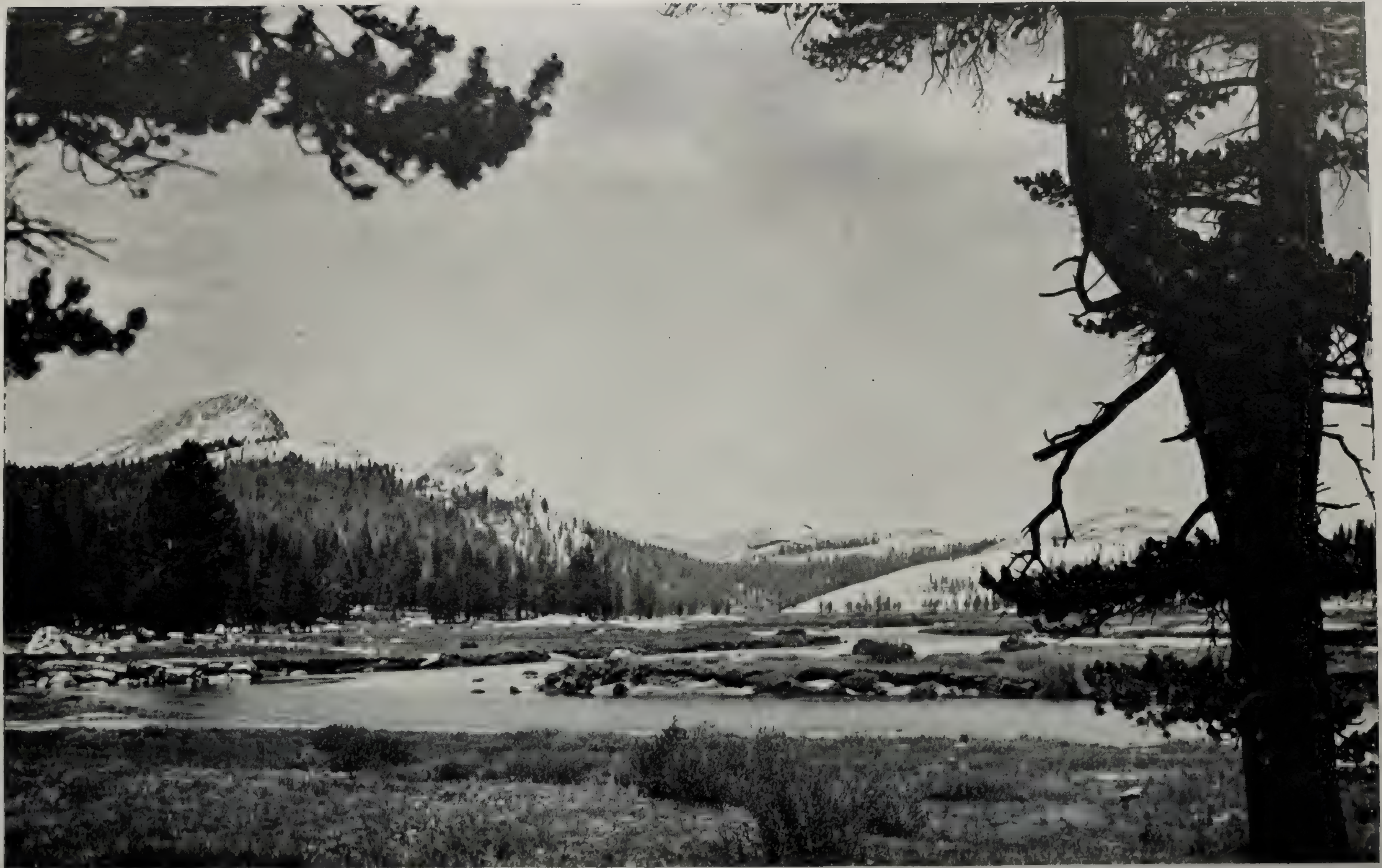


FIG. 3 –The flowery expanse of Tuolumne Meadows.

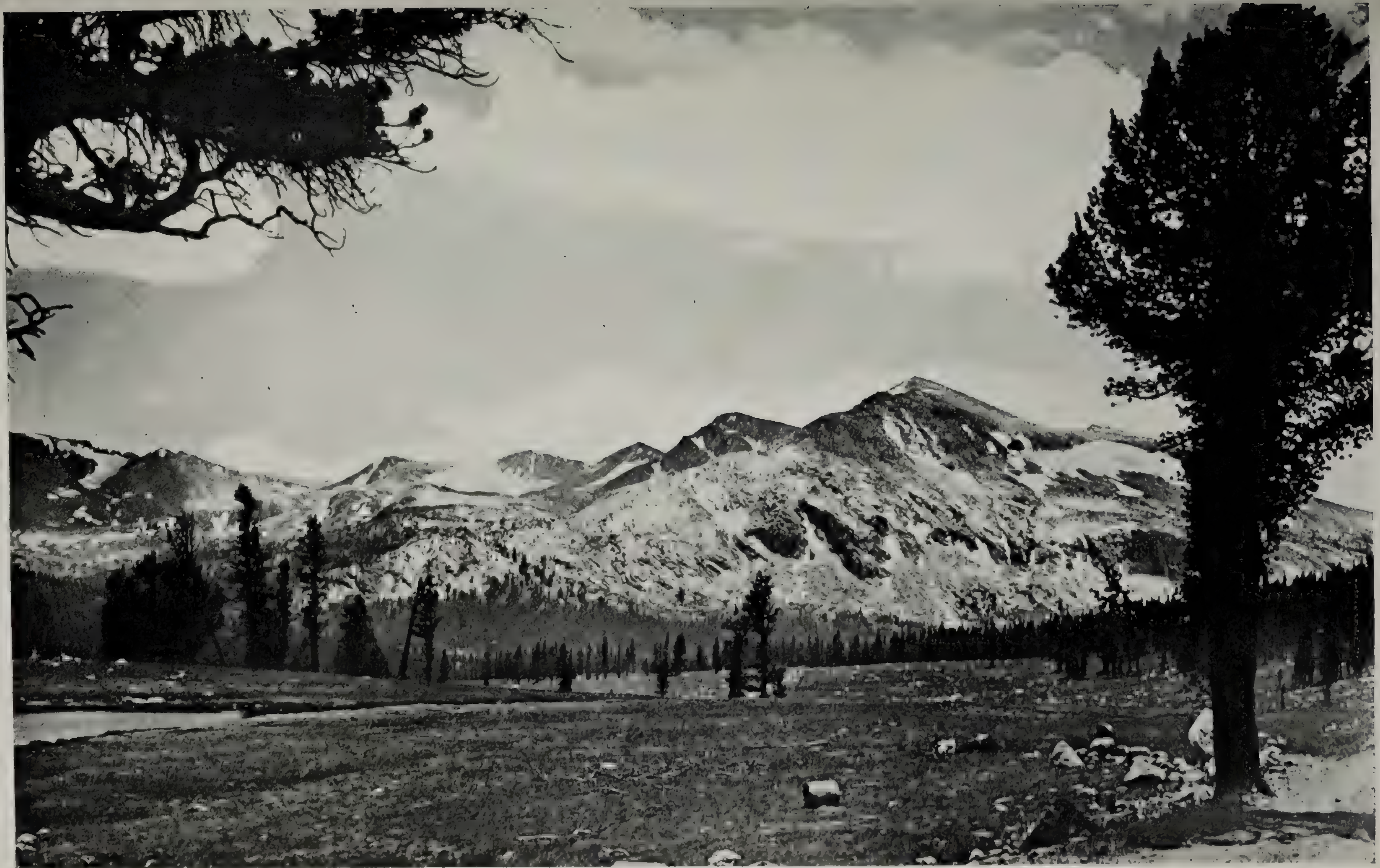


FIG. 4—View from the summit of Tioga Pass, 9,941 feet in elevation.

The road remained in a state of neglect for a great many years and was practically impassable for any kind of vehicle. As it was private property the Government could not improve it, and the owners were not disposed to maintain it although they professed to do a certain amount of work each year. The heirs of the property offered it to the National Government and to the State of California at a constantly reduced figure as the years went by, and from time to time various Secretaries of the Interior recommended its purchase, but nothing definite resulted. Several bills were also introduced into Congress providing for the purchase of the road, but they never became law.

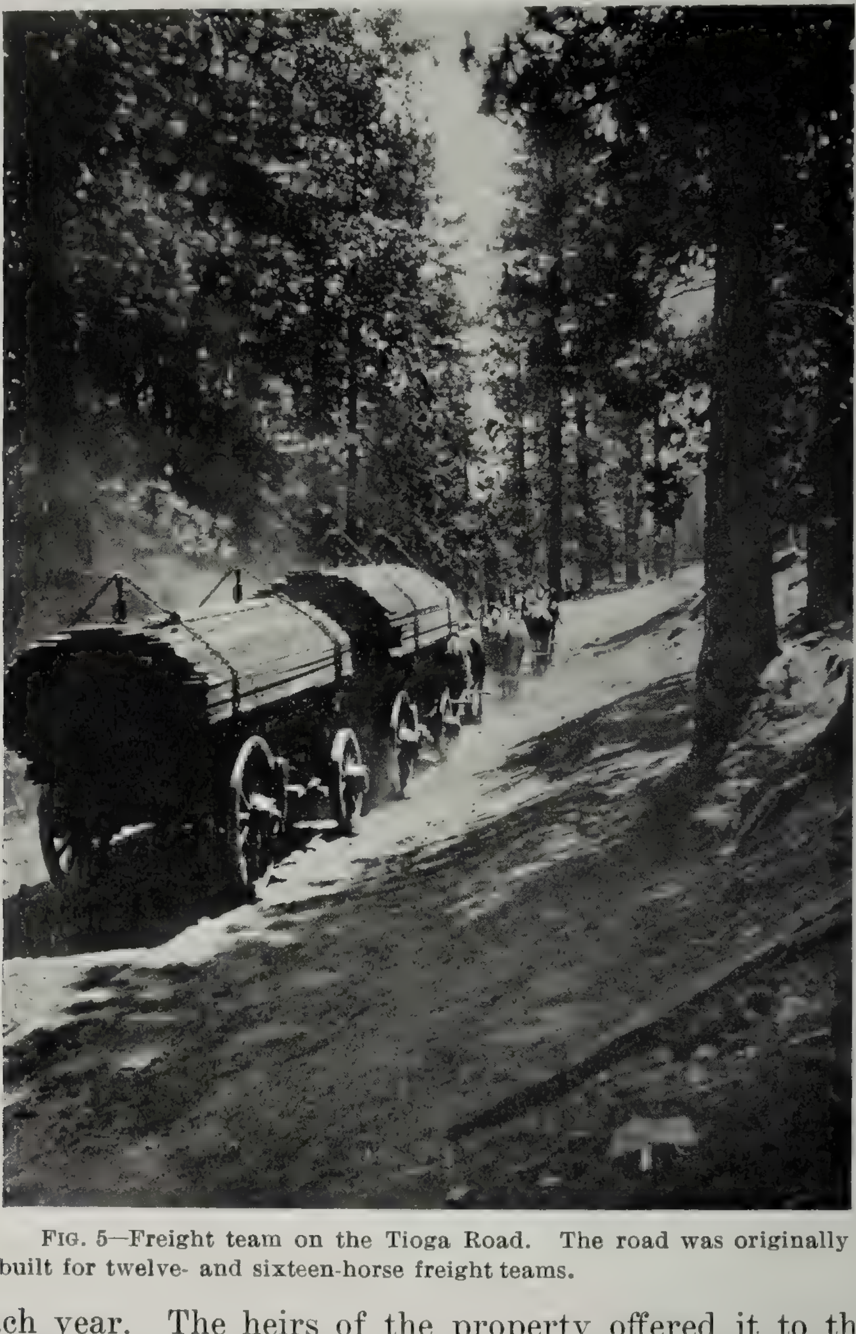


FIG. 5—Freight team on the Tioga Road. The road was originally built for twelve- and sixteen-horse freight teams.

ITS ACQUISITION BY THE GOVERNMENT

The importance of the Tioga Road had been recognized for some time, not only as a means of establishing a new route across the mountains and opening up the northern part of the Yosemite region but also as a connecting link of unsurpassed scenic quality for transcontinental automobile travel. In 1915 the road was finally acquired by a group of patriotic citizens, headed by Stephen T. Mather of Chicago, and deeded over to the Government. In July of the same year, through the co-operation of the U. S. Department of the Interior and the Department of Engineering of the State of California, this remarkable highway was opened to motor-car travel.

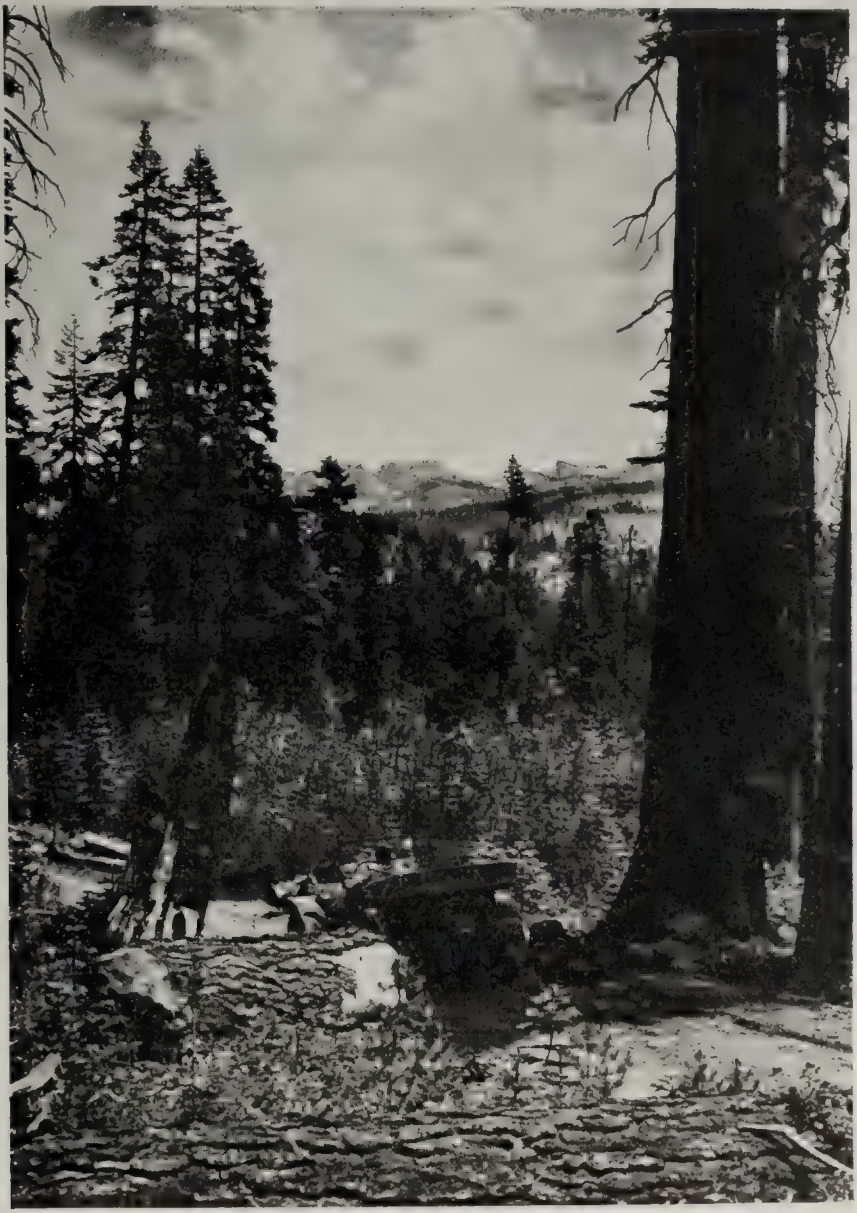


FIG. 6—The main crest of the Sierra Nevada from the Tioga Road.

From Sequoia to Yosemite Creek

The Tioga Road, as originally built, had its initial point at Sequoia, or Crocker's Station, a familiar spot to all who have journeyed into the Yosemite by the Big Oak Flat Road. Two miles beyond Sequoia, a covered bridge spans the South Fork of the Tuolumne River. Leaving the Yosemite route at this point, the road gradually ascends for twenty miles through a luxuriant forest of pine, spruce, and fir interspersed with groups of the imposing sequoia. The grade is a rather remarkable one, for, although it rises from the Tuolumne River at 4,350 feet to the Yosemite Creek divide at 8,550 feet, most of it can be traveled in high gear at an easy gait. The restful beauty of this highway carpeted with fragrant needles is all-absorbing to the traveler as he winds upward through the silent forest of giant trees. Under the heat of the midday sun the life of the woods is at rest, and not a sound is heard but the whir of the motor and an occasional crunch, crunch, as the wheels pass over a fallen cone.

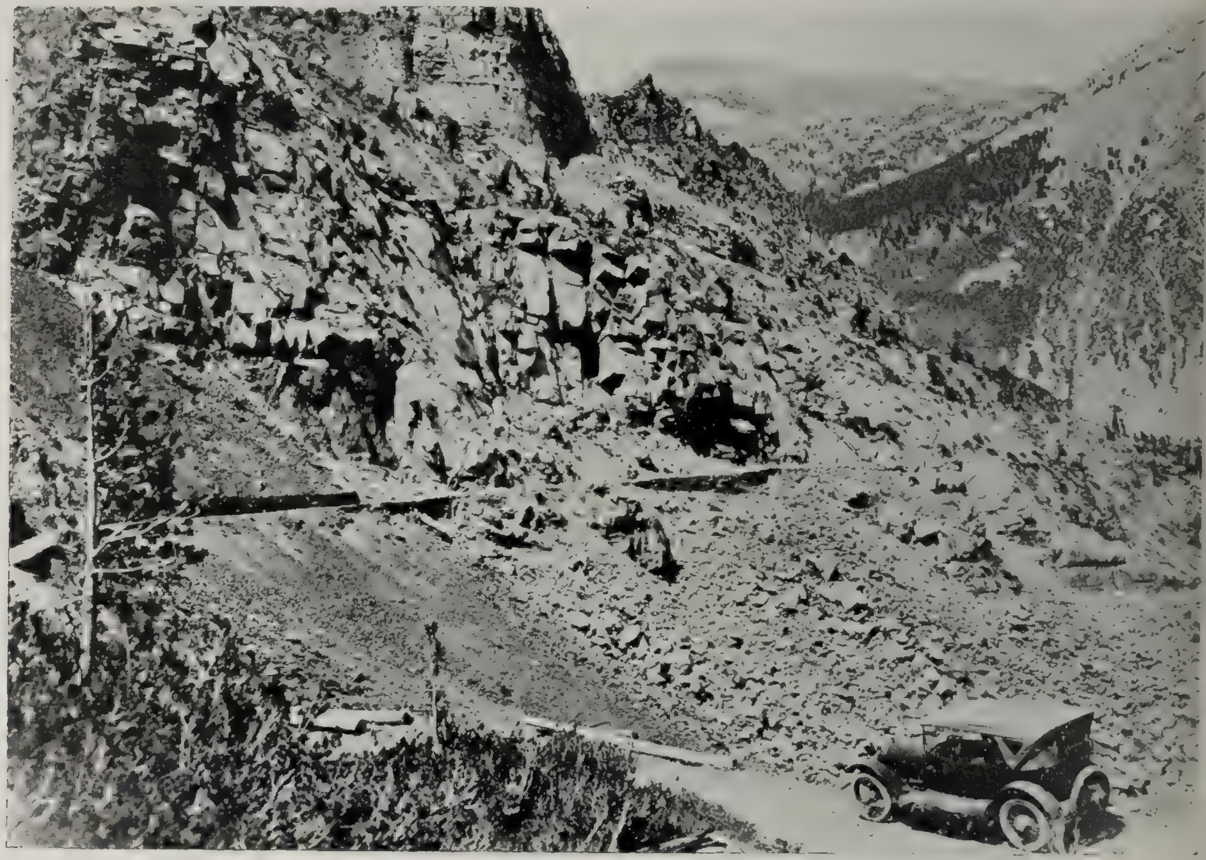


FIG. 7—The road leading down Leevining Canyon.

As the road emerges above Yosemite Creek, comprehensive views of the whole upper Sierra region are obtained, framed in the drooping branches of the graceful sugar pines with their great cylindrical cones swinging at the very tips. This tree is a never-ending source of enjoyment; no two are shaped alike, and their immense arms, thrown out to form a palmlike crown, are decorated by the distinctive cones. A descent of four miles brings the road to Yosemite Creek, whose banks offer innumerable choice camping spots. Especially will the disciple of Izaak Walton be tempted to linger here.

LAKE TENAYA AND TUOLUMNE MEADOWS

The next nine miles to the summit of Snow Creek divide contains a few sharp pitches that reach twenty per cent for short distances, but the roadbed is hard and presents little or no difficulty. Although no expense was spared originally to put a good surfacing on the road, years of neglect almost entirely effaced this part of the work, and it will take considerable time to make a smooth top again. Two miles below Snow Creek divide lies Lake Tenaya, a wonderful body of liquid blue set in a massive bowl of granite. Sweeping up from the surface of the lake great masses of rock stretch to the summits of the peaks thousands of feet above. The road hurries down to the shores and skirts the lake along an exceedingly well-built sea wall blasted from the solid rock. From the head of Lake Tenaya the route ascends eastward through a narrow gorge whose walls rise sheer on either side far into the blue of the sky. Many a diminutive waterfall is supplied from melting snowdrifts high up on the granite peaks, and each fall contributes its share to the rushing torrent beside the road.

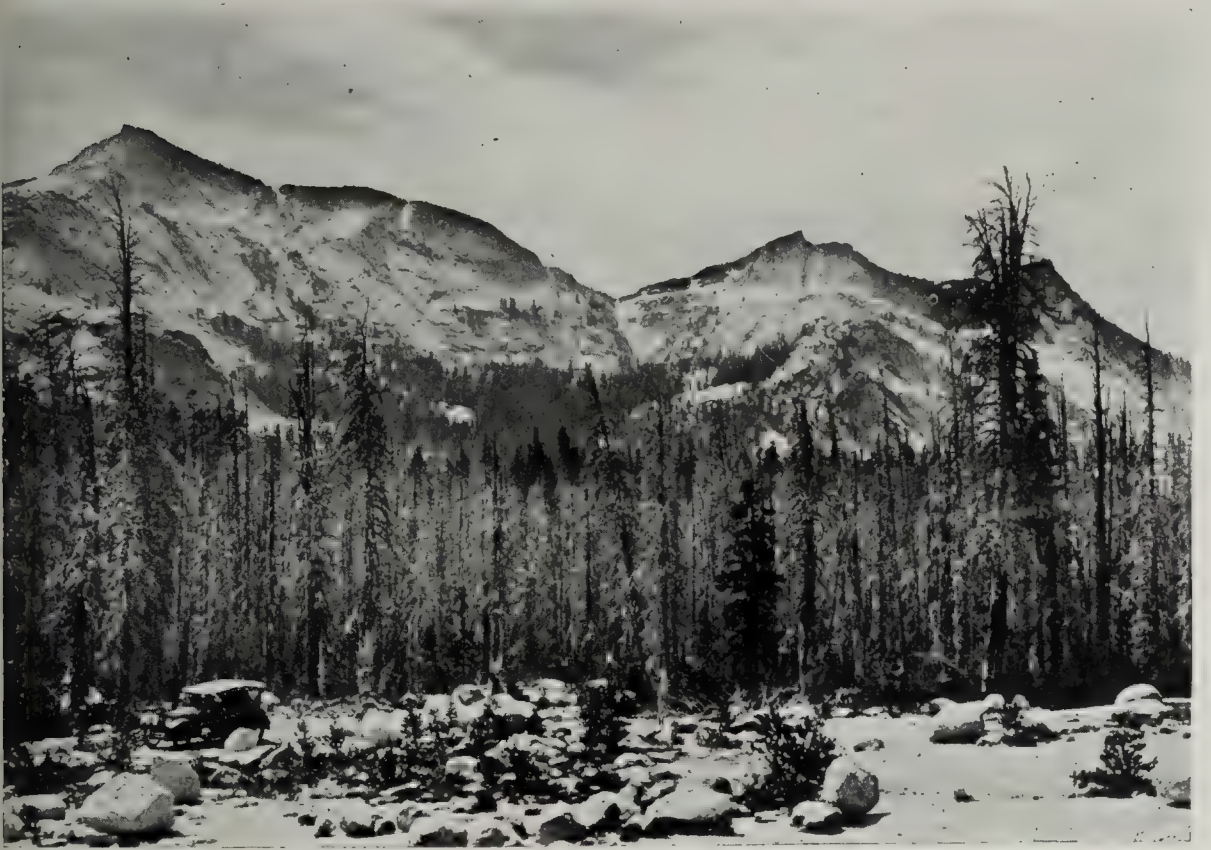


FIG. 8—Rugged granite peaks above Lake Tenaya.

Nine miles beyond Tenaya the flowery expanse of Tuolumne Meadows is suddenly spread at the traveler's feet. These meadows, encircled by the majestic peaks of Mt. Lyell, Mt. Gibbs, Mt. Dana, and Cathedral Peak, are far-famed as the most beautiful open land in the whole length of the Sierras. Through their center the Tuolumne River meanders in a leisurely fashion, as if gathering strength for its wild plunge through the Tuolumne Canyon into Hetch Hetchy Valley to the west.

LEEVINING CREEK

After the Meadows are traversed a gradual ascent brings the road to the summit of Tioga Pass at an elevation of 9,941 feet above sea level—the highest road pass in the Sierras. A splendid array of rugged, wind-swept summits is presented on all sides, while on the floor of the pass a few struggling pines are fighting for their existence against the elements. After passing Tioga Lake the road follows the winding course of Leevining Creek as it threads its way through masses of curious rock formation. The huge rocks in their desolate grandeur begin to close around, when, without warning, the road plunges into the awe-inspiring depths of Leevining Canyon. A remarkable piece of engineering carries the smooth, well-graded highway hundreds of feet above the foaming creek for nine miles down the almost vertical sides of this gorge, affording views of terrifying impressiveness. The Leevining Creek road, for more than two miles cut from the solid rock, is notable throughout for the substantial manner of its construction. It was built by the State of California at a cost of $50,000, having been begun in 1901 and finally completed in 1911.

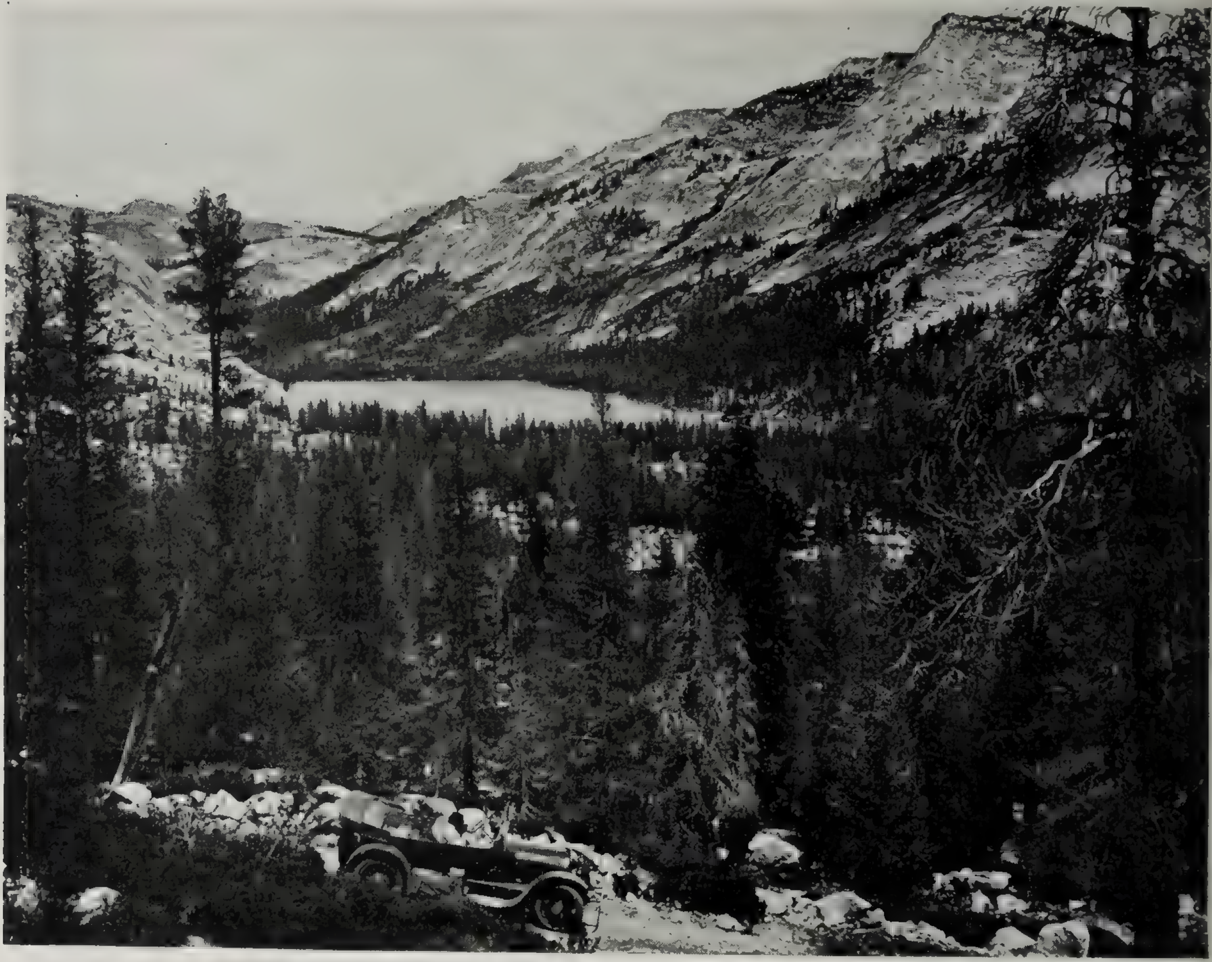


Fig. 9—Lake Tenaya, set in a massive bowl of granite.

From the mouth of Leevining Canyon the road drops rapidly down to the shores of Mono Lake, the Dead Sea of the West. At this point is encountered El Camino Sierra, the road that parallels the eastern flank of the mountains, hugging close under their massive wall from Owens Lake to Reno, Nevada. Here the Lincoln Highway is joined, and the wayfarer is once more on the beaten path.

THE CLIMATE OF LIBERIA AND ITS EFFECT ON MAN

By EMORY ROSS
Disciples of Christ Congo Mission

Not the least of the pleasures of doing a bit of the more ordinary work of science in some of the tucked-away places of the earth is the fact that it has never been done before. Such a pleasure the writer has been privileged to enjoy in making a series of meteorological observations in the little-known country of Liberia.[1]

The Population of Liberia

The negro is supreme in Liberia. No one of another race may own land or vote in the republic. The ruling class is made up of descendants of American negroes who colonized there and numbers not more than 20,000 or 25,000 people. The native pagan population is variously estimated; the writer's guess is that it is about 750,000. The whites living in the republic up to the time of the country's declaration of war against Germany numbered about 200. Monrovia is the capital and largest city, with a population of 8,000—in round numbers 75 whites, 3,000 Americo-Liberians, and the rest natives.

The Coast Region

Liberia occupies the westernmost part of Upper Guinea, fronting on the Atlantic for 300 miles with a coast line extending in a northwesterly to southeasterly direction. Along practically the whole coast is a line of lagoons, lying parallel to the sea and separated from it by sand bars from 30 to 100 yards wide. Into these lagoons, which vary in length up to 15 miles and in width from 10 to 75 yards, pour numerous small creeks and the surface run-off of a limited area inland. The lagoons empty by overflow into the sea during the rainy season, at which times the outlet remains open for a fortnight or so; but aside from this there is usually no connection with salt water. Behind the lagoons—in most cases from three to six miles back from the ocean—are numerous estuaries lying parallel to the coast for distances up to 30 miles or more and connected with the sea through the mouths of the rivers proper, which enter it at intervals of about 30 miles along the coast.

This network of coastal lagoons, estuaries, and rivers has an important bearing on the healthfulness of the best-developed section of Liberia, the coast region.

---

[1] The mission board with which the writer was associated in Liberia had a broad, modern conception of its functions, and furnished simple equipment for various sorts of work outside the beaten paths of time-honored missionary endeavor. Acknowledgment is also made to friends who continued the writer's observations during periods of absence.

The flat coastal belt, diversified by occasional hills of 200 to 300 feet, has an average width of about 25 miles. It is terminated by abrupt elevations that cause rapids in all the rivers, rendering further navigation impossible and limiting the advance of civilization into the interior. Rapids are repeated, and a gradual elevation is continued, through the Liberian hinterland to the crest in the western Sudan which forms the watershed between the extreme West African coast and the Niger sources.

The coastal belt has been more or less cleared of tall forest; but, except for a small extent of savana in the north, the interior is clothed in forest that in denseness and luxuriance has been said to surpass even the forests of the northeastern Congo Basin.[2] The dense forest is an index to the climate of the country, of which, however, our direct knowledge is very limited.

The Climate

Meteorological Records

In the outstanding work on the climate of Africa,[3] the author opens the abbreviated chapter on Liberia with the remark that very little is known of the climate, and thereupon he proceeds to show convincing proof of his observation. So far as the present writer is aware, the only meteorological records in existence that have been made in Liberia over a period of more than a few weeks are those begun by himself in 1913 and ended in 1915 by Mr. Lewis A. Hurt and those made by the Deutsch-Südamerikanische Telegraphengesellschaft, A.-G., between January, 1915, and Liberia's declaration of war in 1917—both of which sets of records were available in the preparation of this paper.[4] The records were obtained at points 20 miles apart, the one set at the station of the Christian Woman's Board of Missions immediately on the coast near the town of Schiefflin (Schiefflinsville) in 6° 11′ N. latitude and 10° 33′ W. longitude, and the other at the station of the German cable company at Monrovia in 6° 19′ N. latitude and 10° 49′ W. longitude. The Monrovia station was 225 feet higher than the station at Schiefflin.

Summary of the Records

The mean annual temperature was 78.5° F. The means of the warmest month (March, 80.4°) and of the coolest months (July and August, 76.4°) were respectively but two degrees above and below the annual mean. The highest recorded shade temperature was 93°. This was reached but twice, during a hot spell in March and April, 1915. Aside from these two months, 91° was the highest temperature noted, and that point was reached but nine times during two and a half years' observations. All temperatures of 67° or lower occurred during the dry months of December, January, and February. The mean monthly range varied from 25° in January to 15° in August. The mean daily range varied from 18.4° in January to 9° in August. The smallest daily range was 3°, noted in July. Daily ranges as small as 5°, 7°, and 9° are common during the rainy months from June to September.

---

[2] Sir Harry Johnston: Liberia, 2 vols , London, 1906; reference in Vol. 1, p. 8.

[3] Alexander Knox: The Climate of the Continent of Africa, Cambridge (Engl.), 1911, pp. 205, 206.

[4] A few observations for short periods of time are given by Sir Harry Johnston, *op. cit.*, Vol. 2, pp. 504-512. A summary of the records at Schiefflin for 1913-14 was given in the *Monthly Weather Rev.*, Vol. 43, 1915, pp. 178, 179.

The rainy season occupied about seven months of the year, from mid-April to mid-November. During these seven months the precipitation was 170 inches out of the annual total of 179.5 inches. With the adjoining area of southern Sierra Leone, Liberia is probably the wettest part of Africa, except for one or two isolated mountains, including Cameroons Mountain. The average number of clear days per month (less than one-third cloudy) decreased from 18 in March to 1.3 in July; the cloudy days (more than two-thirds cloudy) increased from 2 in April to 24.3 in July. June was usually the rainiest month. During the first four days of June, 1914, 20.43 inches of rain fell, and on the 16th and 17th of the same month the fall was 13.25 inches. The period of longest drought ran from December 28, 1913, to February 19, 1914—a total of 54 days, during which time 0.1 inch of rain fell on the 32nd day.

During July and August there is a period of lessened precipitation known locally as the "middle drys" and well established in the oral tradition of Liberia. It is commonly expected to begin about the last week of July and to continue till the middle of August. Table VI shows how nearly it conforms to this expectation. This suggestion of the double rainy season characteristic of the equatorial regions is in accordance with the latitude (6° 11′ N.). Farther south the double maxima are more clearly marked. The régime at Bingerville and Bassam in the Ivory Coast (5° 20′ N.) is described as very rainy in May and June, rainy in October and November, with less rain in July, August, and September.[5] Farther north, in Freetown, Sierra Leone (8° 30′ N.), there is no hint of a break in the rains, the maximum occurring as a well-defined peak in August.[6]

SENSIBLE TEMPERATURES AND INSOLATION

The sensible temperatures of the Liberian coast are not so high as those of many places in intermediate latitudes. The writer, at any rate, has never experienced in Liberia the sense of suffocation, gasping respiration, and general oppression that he has repeatedly felt in July and August in Indiana and Illinois, not to mention Mississippi. The sensible temperatures are not high, relatively, except in pockets cut off from the breeze and in places where a rocky surface formation adds its reflected heat. Monrovia has such a surface, but its elevation and the sea breeze tend to keep down the sensible temperature to levels found elsewhere.

---

[5] Gaston Joseph: La Côte d'Ivoire, Paris, 1917, p. 16.

[6] Knox, *op. cit.*, p. 113.

Yet, while the heat is not so extremely and sharply oppressive during a given day or week as may be the case in other and more temperate regions, it is much more dangerous in its steady persistence (see Tables I and II), and the cumulative effect is extremely enervating. Insolation values are exceedingly high, how high one lacks data for determining. It does not require instruments, however, to give one an appreciation of the power of the sun's rays. Negligent or ignorant exposure by a European of a bare head to the sun for periods of 2, 5, 10 minutes, and the like, has resulted at once in prolonged, pernicious fevers and sometimes in death. These cases are known as a "touch of sun" and in milder forms are doubtless

TABLE I—SUMMARY OF METEOROLOGICAL OBSERVATIONS AT SCHIEFFLIN, LIBERIA, MAY, 1913, TO OCTOBER, 1915

Months	Temperature (degrees F.)							Precipitation			Cloudiness		
	Mean	Mean max.	Mean min.	Absol. max.	Absol. min.	Max. daily range	Mean daily range	Total inches	Max in 24 hours	No. days more 0.01″	Clear	Partly cloudy 30%–70%	Cloudy
1913													
May	**80.**	87.7	72.3	**91**	68	21	15.4	9.93	2.58	17	8	14	9
June	78.7	85.3	72.1	90	69	18	13.2	27.48	4.38	24	1	4	25
July	77.7	83.4	72.	88	68	16	11.4	30.69	6.24	**29**	**0**	0	**31**
August	77.0	81.7	72.3	86	71	14	9.4	30.07	6.16	25	3	11	17
September	**76.6**	81.7	71.6	85	68	14	10.1	23.90	3.06	26	5	9	16
October	78.6	84.7	72.6	89	70	17	12.1	24 35	4.52	26	12	14	5
November	79.6	86.6	72.5	89	70	18	14.1	8.74	2.35	15	7	17	[illegible]
December	79.9	87.8	72.	**91**	66	22	15.8	1.74	0.74	4	13	11	7
1914													
January	77.8	87.5	**68.2**	**91**	**58**	**31**	**18.7**	0.10	0.10	1	16	10	5
February	78.9	87.6	70.2	**91**	65	24	17 8	1.84	1.84	1	15	8	5
March	**80.1**	**88.2**	72.	**91**	68	21	16.2	1.29	0.48	6	18	8	5
April	79.8	87.9	71.6	**91**	70	19	16.3	8.76	2.43	14	**25**	5	**0**
May	79.4	87.3	71.6	90	69	20	15.6	19.70	3.85	23	8	22	1
June	78.	82 6	73.3	87	70	15	9.3	**50.35**	**7.50**	**29**	5	13	12
July	**75.3**	**79.3**	71.3	84	69	**12**	**8.**	13.25	3.20	23	3	6	22
August	**75.8**	80 3	71.3	85	68	17	**8.9**	14.46	2.95	20	6	9	16
September	76.8	81.6	72.1	84	69	13	9.5	26.43	3.04	**28**	6	14	10
October	78.1	83.6	72.6	87	69	14	11.	31.66	4 02	**30**	7	14	10
November	78.7	85.	72.4	88	69	17	12.6	13.90	2.50	23	12	14	4
December	79.8	**88.2**	71.5	90	**61**	**28**	16.7	4.43	2.77	8	14	15	2
1915													
January	78.7	87.8	**69.6**	90	**62**	**28**	**18.2**	0.11	0.10	2	17	10	4
February	**80.4**	**88.4**	72 3	**91**	70	19	15.4	0.38	0.14	4	12	10	6
March	**81.5**	**90.3**	72.7	**93**	70	21	17.6	2.87	0.82	7	18	6	7
April	**81.2**	**89.8**	72.6	**92**	70	21	16.8	13.53	4.20	14	8	18	4
May	**80.3**	87.3	73.4	90	71	18	14.	26.05	5.	24	6	17	8
June	78.5	83.6	73.5	87	71	15	10.1	**34.87**	**9.**	**28**	**0**	17	13
July	**76.4**	80.8	71.9	85	68	13	**8.9**	30.58	6.55	24	1	10	20
August	76.9	81.2	72.6	85	71	**11**	**8.8**	18.82	**8.20**	24	2	9	20
September	77.6	82.7	72.5	86	70	**12**	10.3	27.16	6.	**30**	2	14	14
October	79.2	85.1	73.2	88	69	18	12.	31.79	6.12	27	4	19	8

The station of the Christian Woman's Board of Missions, where the observations were made, is near Schieffin (6°11′ N., 10°33′ W.). The instruments were exposed in a cleared space several acres in extent, 25 feet above sea level, 300 yards from the ocean, 50 feet from nearest and only adjacent building. Thermometers were in a large perforated box with double ventilated roof, 5 feet above the ground; the raingage with mouth 3 feet above the ground. The instruments were: thermometers, registered maximum and minimum, made by Taylor Instrument Companies, Rochester; raingage, Glaisher's pattern, made by Short & Mason, London. The observation hour was 5.30 P.M., Greenwich time.

Throughout the tables the mean monthly temperature is derived from the formula (mean max.+ mean min.) ÷ 2. Figures of striking significance are shown in bold-faced type.

the ultimate cause of many a run of fever that baffles the doctor both as to cure and name. A sun helmet of thick pith or cork is the common headgear and is constantly worn out of doors until 4.30 or 5 P. M., during rainy and cloudy days as well as during sunshine. There are, of course, exceptions to this rule, as to all others. An individual here and there wears an ordinary felt hat apparently with impunity, but he is the *rara avis* of the tropics.

TABLE II—SUMMARY OF METEOROLOGICAL OBSERVATIONS AT MONROVIA, LIBERIA, JANUARY, 1915, TO JULY, 1916

MONTHS	TEMPERATURE (DEGREES F.)						PRECIPITATION (INCHES)			PRESSURE (INCHES)
	MEAN	MEAN MAX.	MEAN MIN.	ABSOL. MAX.	ABSOL. MIN.	MAX. DAILY RANGE	TOTAL	MAX. IN 24 HOURS	NO. DAYS MORE 0.01 mm.	
1915										
January	78.3	84.4	72.	86.	**65 3**	**19.1**	**0.02**	0.02	1	29.91
February	79.3	84.7	74.1	87.8	71.6	14.8	**0.08**	0.05	2	29.91
March	**80.8**	**87.1**	74.5	89.8	69.8	17.1	6 36	1.82	10	29 93
April	**81.1**	**87.1**	75.2	**90.**	71.2	17.5	8.27	2 29	15	29 93
May	79.7	85.5	73.9	88.7	70.7	16.	21.13	4 50	21	29 96
June	77.7	81.7	73.8	87.1	70.3	13.3	**31.65**	5.26	**30**	**30.03**
July	**76.1**	**79.7**	72.5	84.7	68.9	**11.1**	28 95	5.36	26	**30.05**
August	**76.5**	**79.7**	73.	83.3	71.2	11.3	15 36	3.	19	**30.04**
September	77.	81.	73.	84.2	70.	13.3	**33.55**	5.18	**28**	**30.**
October	78.8	85.8	73.4	86.2	68.2	18.	29.40	**6.04**	27	29 98
November	78.6	84.2	72.9	87.4	68.2	18.	5.24	1.26	20	29 98
December	78.6	84.4	72.7	87.4	68.	18.9	1.36	1.07	6	29.96
1916										
January	78.6	84.2	73.	88 9	69.8	**19.1**	0.42	0.42	1	29.94
February	79.5	85.8	73.	87.1	68.7	18.1	**0.20**	0.23	3	29.92
March	**80.1**	85.8	74.1	88.9	69.3	17.8	2.39	0.95	7	29.91
April	79.9	85.5	74.1	88.	69.1	17.1	5.46	3.45	10	29.91
May	79.3	85.3	73.4	88.5	**66.**	**20.**	11.25	2.49	20	29 94
June	77.5	82.2	72.7	86.	69.3	14.	**35.27**	5.02	**28**	29 95
July	**75.9**	**79.7**	72.	83.3	68.	**12.8**	**42.**	5.18	23	**30.01**

Observations were made at the station of the Deutsch-Südamerikanische Telegraphengesellschaft situated on the north side of Cape Mesurado, which juts out into the sea at an elevation of 290 feet. The station itself is about 230 feet above sea level and about 100 yards from the ocean. Thermometers, maximum and minimum of standard German make; raingage, similar to Glaisher's pattern. The thermometers were exposed on the second-story veranda of one of the cable buildings, landward side, 20 feet above the ground in open air with no shelter, but were never exposed to the direct rays of the sun. The raingage was placed similarly to that at Schiefflin except in the midst of more buildings.

TABLE III—SUMMARY OF CONTEMPORARY METEOROLOGICAL OBSERVATIONS AT MONROVIA AND SCHIEFFLIN, LIBERIA, JANUARY TO OCTOBER, 1915*

MONTHS 1915	TEMPERATURE (DEGREES F.)						PRECIPITATION		
	MEAN	MEAN MAX.	MEAN MIN.	ABSOL. MAX.	ABSOL. MIN.	MAX. DAILY RANGE	TOTAL INCHES	MAX. IN 24 HOURS	NO. DAYS MORE 0.01″
January	78.5	86.1	**70.8**	88.	**63.6**	**23.5**	**0.06**	0.06	**1.5**
February	79.8	86 5	73 2	89.4	70.8	16.9	0.23	0.10	3.
March	**81.1**	**88.7**	73.6	**91.4**	69.9	19.	4.61	1.32	8.5
April	**81.1**	88.4	73.9	91.	70.6	19.2	10.90	3.24	14.5
May	80.	86.4	73 6	89.3	70.9	17.	23 59	4.75	22 5
June	78.1	82.7	73.6	87.	70 6	14.1	**33.26**	**7.13**	**29.**
July	**76.3**	80.2	72.2	84.9	68.4	12.	29 76	5.95	25.
August	76.7	80.4	72.8	84.1	71.1	**11.1**	17.09	5.60	21.5
September	77.3	81.8	72.8	85.1	70.	12.6	30.35	5.59	29.
October	79.	85 4	73.3	87.1	68.6	18.	30.59	6.08	27.

* The January-October, 1915, monthly means shown in Table I, made near Schiefflin, are added to the monthly means for the same period shown in Table II, made at Monrovia, and their sums divided by 2, to obtain Table III.

Effects of Elevation

Elevation above sea level markedly affects the temperature. In Freetown, Sierra Leone, 300 miles upcoast from Monrovia, the difference in mean monthly maximum temperature (1907-08) between an approximately sea-level station and a hill station 880 feet above the sea was, at a minimum, 7.6° F. (August) and, at a maximum, 10.9° (April). In a section of the northwestern hinterland of Liberia, where, so far as we have been able to learn, no white men had ever before gone, the writer's aneroid registered

Table IV—Temperature Means, Monrovia and Schiefflin, Liberia, from three years' observations*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean	78.3	79.3	**80.4**	80.2	79.8	78.2	**76.4**	**76.4**	76.9	78.7	78.9	79.4	78.57
Mean maximum	85.9	86 6	**87.6**	87.3	87.1	83.5	81.	**80.8**	81.7	84.6	85.3	86.8	84.85
Mean minimum	**70.7**	72.1	73.2	73.2	72.5	73.	71.8	72.1	72.2	72.8	72.6	72.1	72.36
Mean daily range	**18.4**	16.6	16.9	16.5	15.	10.9	9.4	**9.**	10.	11.7	13.3	16.2	13 65
Monthly range	**25.**	21.	21.	20.	21.	18.	17.	**15.**	16.	18.	19.	24.	19.58

* Compiled: May, 1913, to Dec., 1914, from Table I; Jan., 1915, to Oct., 1915, from Table III; Nov., 1915, to Apr., 1916, from Table II.

The mean daily range is compiled from Table I only. The monthly range is the mean of the difference between the absolute maximum and absolute minimum.

Table V—Precipitation and Cloudiness Means, Monrovia and Schiefflin, Liberia*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean rainfall (inches)	**0.19**	0.76	2 76	8.37	17.74	**37.03**	24.57	20.54	26 89	28.87	9.29	2.51	179.5
Mean no. of days with more than .01″	**1.7**	2 3	7.2	12.8	20.8	**27.3**	25.7	22.2	**27.7**	**27.7**	19.3	6.	200.7
Mean no. of clear days	16.5	13.5	**18.**	16.5	7.3	2.	**1.3**	3.7	4 3	7.7	9.5	13.5	113.8
Mean no. of partly cloudy days	10.	9.	7.	11.5	17.7	11.3	5.3	9.7	12.3	15.7	15.5	13.	138.
Mean no. of cloudy days	4.5	5.5	6.	**2.**	6.	16.7	**24.3**	17.7	13 3	7.7	5.	4.5	113.2

* Sources as in Table IV. Cloudiness is compiled from Table I only. Clear day has less than one-third, partly cloudy from one-third to two-thirds, and cloudy more than two-thirds of sky obscured by clouds.

Table VI—Diminution of Precipitation during the "Middle-Dry" Season, Schiefflin, Liberia

Date		No. of days in period	No. of days of rain during period	Percentages of days of rain during period	Total rainfall	Mean daily rainfall
Begin	End				Inches	
19	13					
July 1	July 24	24	22	92	30.02	1.25
July 25	**Aug. 14**	21	16	**76**	**4.3**	**0.2**
Aug. 15	Aug. 31	17	16	94	26.54	1.56
19	14					
July 1	July 7	7	5	71	5.99	0.85
July 8	**Aug. 15**	39	24	**62**	**8.52**	**0.22**
Aug. 16	Aug. 31	16	15	94	13.20	0.82
19	15					
July 1	Aug. 1	32	25	78	33.48	1.05
Aug. 2	**Aug. 26**	25	18	**72**	**6 40**	**0.25**
Aug. 27	Aug. 31	5	5	100	9.52	1.90

1,950 feet before an accident in the hands of an unsuspecting porter rendered it useless for the rest of the journey. At that elevation and at the height of the dry hot season, we traveled on foot day after day without undue loss of strength, the expedition ending its three-months' journey by a forced march of 225 miles through dense forest and over fearful paths in nine successive days, an average of 25 miles a day. Such a record as that we have never been able to approach on the low-lying coastal plain, but we have experienced similar beneficial effects of altitude on physical endurance in the savanas of the Ubangi basin of Central Africa. The desirability of getting up above the sea is so immediately apparent that the first Europeans to settle the coast built their houses on the tops of hills, wherever such locations offered, and thereby dearly purchased the experience that later arrivals have had as a guide. For the hilltops, while

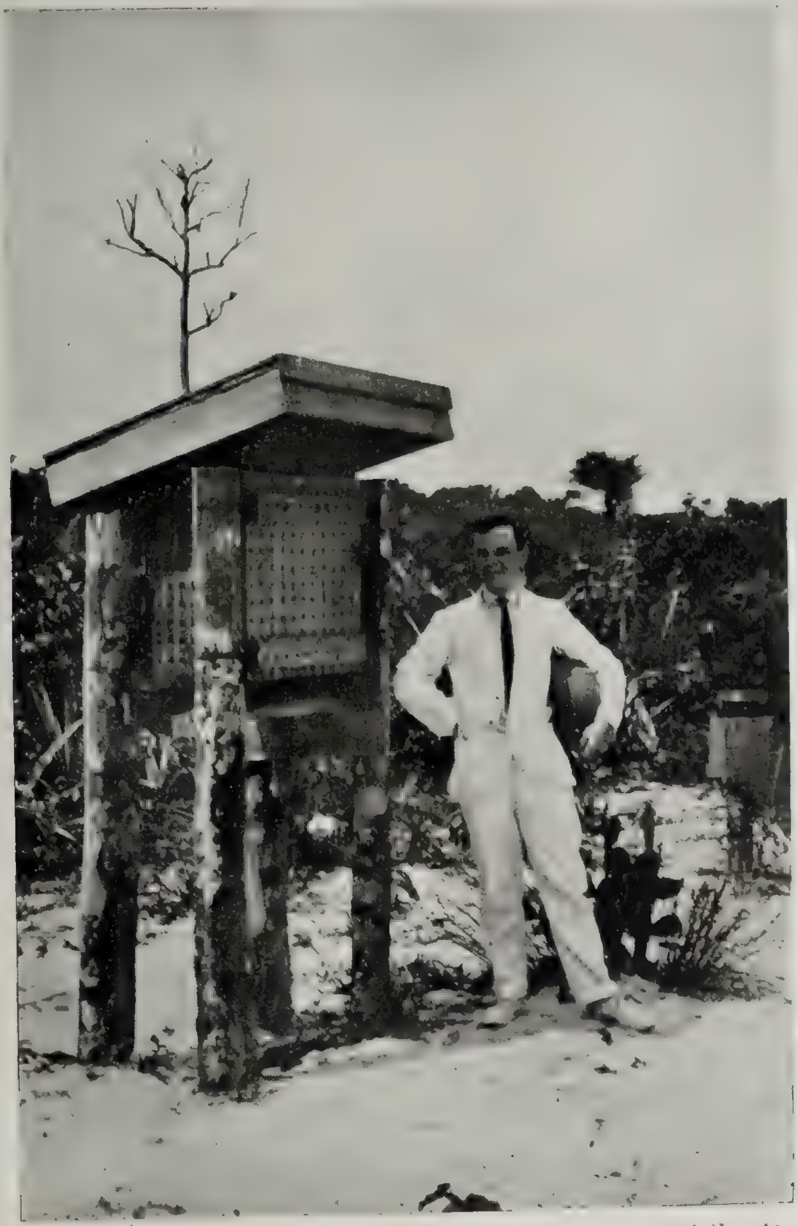


FIG. 1—The author, thermometer shelter, and raingage at the station of the Christian Woman's Board of Missions, Schiefflin, Liberia.

most agreeably cool, were too exposed to every wind that blew to be healthful; chills, fever, congestion, dysentery, death follow the winds to the tops of hills. Houses built later are perched on the sides of hills in some protected spot where the benefits of elevation may be had without its most conspicuously attendant evil. The desire to get up above things along the swampy West Coast is so strong that most Europeans prefer to climb stairs to living, dining, and sleeping rooms on the second and third floors rather than remain on the more easily attained first floor. This tendency of Europeans to live up off the ground disappears as one gets into the interior of the continent where the surface elevations above sea level are higher, and in Central Africa a house of more than a single story is exceptional.

The Winds as a Factor in Habitability

The factor that makes the coast as good as it is for white men is the winds. Day after day the sea breeze blows, and night after night the land breeze goes back out to sea. Morning comes, and the shift again is made; while during the lull that intervenes around 8 or 9 o'clock each morning, as the land breeze trades itself for the wind from the sea, one has a taste of what life might be there without the winds. Fortunately periods of complete calm are rare, and one has only discreetly to place oneself in the breeze to be cool. During the northern summer, when an area of low pressure obtains over the Sahara, the dominant wind of the West Coast is the moisture-laden southwest monsoon. The winter months are characterized by the *harmattan*, blowing intermittently from the northeast. Knox writes of this wind:[7]

> The Harmattan is experienced as a wind which blows, especially in the months of December, January, and February, from the N.E. and is a hot wind in some localities and a cold wind in others, according to circumstances. During this season, in the actual coast districts, it alternates with the land breezes, which blow from midnight till about sunrise, chiefly from the N.W. As a general rule the Harmattan begins early in the morning and falls off towards midday. Dried by its passage over the warm sands of the Sahara, it brings sandstorms in its course. Under its influence the lagoons of the coast region rapidly give up their water, while stagnant waters disappear altogether, as, except perhaps for an occasional storm, it does not rain during the Harmattan period. Further, in the process of this evaporation, it gives up a large amount of heat and is thus rendered a comparatively cool wind. The Harmattan generally gives place to sea breezes from the S.W., while land and sea breezes alternate during the remainder of the year.

One may say that the nights are always cool. No sooner has the sun dropped to within an hour or so of the western horizon than every living thing seems to find at least some small relief from the severe conditions of the preceding ten hours. The birds, silent since 10 or 11 o'clock in the morning, begin to sing; the wild life of the forest bestirs itself, and feeding and drinking begin again around the common water holes; the native appears more numerously in the open spaces of the towns and *fakais*, and preparations are made for the one ceremonial meal of the day, which is eaten in the evening, and for the strenuous activity of the play or the dance that may quite likely follow when darkness falls. The European, wise in following the example of native life about him, closes his factory or leaves his mission work or government office and goes out for a stroll or a horseback ride or a game of tennis. Evening is the social time *par excellence* of the tropics. The cool nights are second in importance to the winds in making the African West Coast habitable for Europeans. Sleep and rest, as far as nocturnal climatic conditions can control them, may be had perfectly. The writer does not recall a night spent in Liberia under less than one blanket, while frequently two or three were needed. The early morning, before 6.30, is mildly fresh but not enough so to invigorate one perceptibly. Between 7 and 9 A. M. there is likely to be a ''muggy'' period of calm, oftentimes the most unpleasant part of the day, while the land breeze is dying away and the sea breeze is getting its daily start. From 11 to 2 o'clock is the time one may expect to ''have a head'' if a ''touch of sun'' has previously been experienced, for during that period the total effect of the sun is so great as to make itself unpleasantly felt even in the best-constructed houses the writer has seen. It is during a part of this period that the siesta is taken. At 4.30 or 5 the evening's coolness has come again, and one is passively content in the thought of having lived through another day.

---

[7] *Ibid.*, pp. 92-93. The character of the *harmattan* in the hinterland of the Guinea coast is discussed by H. W. Braby, *Quart. Journ. Royal Meteorol. Soc.*, Vol. 39, 1913, pp. 301-306.

A Region of High Humidity

Humidity data for Liberia are not available, but for Freetown (Sierra Leone) the mean annual relative humidity is 79.4 per cent, the highest being 84.6 per cent in September and the lowest 74.2 per cent in March. For Grand Bassam, on the Ivory Coast, about 500 miles downcoast from Monrovia, the mean relative humidity for the year (1904 and 1905) is 87 per cent, the highest being 90.1 per cent in June, July, August, and September and the lowest 83 per cent in January. Somewhere between conditions in Sierra Leone and those in Grand Bassam may be found the humidity of Liberia. One may safely say that it is very high; certainly as great as in Sierra Leone but probably not so extraordinarily high as in Grand Bassam.

During the dry season the rainfall is negligible; but moisture is supplied to the plant life by the excessive dews that in many cases are equivalent to light showers. The very heaviest dews come during the early part of the dry season, but they are never absent. Frequently, under the eaves of the corrugated iron roofs of our station buildings, there would be in the morning lines of heavily splashed sand where the dew had poured off the roofs in the night. Every leaf and blade of grass in sight would sparkle in the morning sun while it drooped under the weight of the dew it bore. A native custom not without its amusing side is that of sending a little naked boy ahead through the path which his elders must travel early in the morning, that his body may shake as much dew as possible off the grass and brush which closely borders every path and enable those who follow to pass through dry-shod, as it were. A distinct fall in temperature is not necessary to produce dew. The air is so nearly saturated with moisture that the slightest drop of the thermometer precipitates an appreciable amount. It is only by the moisture thus received that plant life is enabled to remain as green as it does during the blistering heat of the dry season.

THE RAINY SEASON

The storms that usher in the rains come suddenly and usually from the southwest. They terminate as suddenly as they begin. Within an hour a terrific blow and a sharp downpour may have been conjured up out of nothing in the southwest and have passed out of sight to the north or northeast. The first storms of a new rainy season occur usually at night, getting gradually later in their appearance until they have introduced the real daytime rains of the season. Then storms practically cease, and the serious business of pouring water on the earth begins. There is little of the spectacular or boisterous about the rainy season proper; there is a common absence of wind, of thunder, of lightning, of pyrotechnics of all sorts; the rain simply falls—falls steadily and rather quietly for days and weeks and months, and then, in a burst of curt, furious storms, as at its beginning, it stops, and the sun and wind begin their task of lapping up this torrential fall of useless water.

The season of rains is probably the most pleasant one for Europeans. There are a few days during that season when the feeling is one of "stickiness" and great oppression, but such days are not common. The daily temperature range is from 3° to 10° F. A fire in an open grate, if a grate has been built into a house, as is infrequently the case, is a rather happy thing; its genial effect is more in drying out the house than in directly furnishing warmth. The natives are often sufferers from cold on rainy days and sit around the little fires that are kept eternally going within their mud-walled houses. When they find it necessary to travel or work out of doors in an actual rainfall, it is a common practice for them to remove even the scanty cloth they at other times wear, to prevent the chilling of their bodies that would come from the evaporation by the wind of the cloth's moisture as they move about. They think it a strange thing that a white man, instead of reducing the amount of his clothing under those circumstances, should augment it by the addition of a raincoat and a waterproof helmet cover and maybe gloves and gum boots.

During the midst of the rains there is no stagnant water, and mosquitoes are scarce. The weeks at the beginning and particularly at the end of the rainy season are the most unhealthful. At the latter time the earth is filled to overflowing with water, and, as the higher areas dry out, the water, caught in pockets and depressions, big and little, and protected by dense foliage above, furnishes the very best sort of birthplace for the germs and the animal life that acts as hosts and transmitters of these germs, and they soon are seriously attacking the human inhabitants of the region.

INFLUENCE OF THE RAINS ON HUMAN LIFE

The rains have an important influence on the life of the country in relation to travel, transportation, communication, and food supply. The wet season largely determines the time for traveling and the means of locomotion. Natives having visits to pay to distant parts plan to go during the dry season. White officials or traders try to make the necessary tours of their posts during these months. Missionaries know it is best to plan their work so that the special activities of the base station may be developed during the rains, leaving the rest of the year for extensive itineration. It is not always possible to do these things, but the rains cause one to try. Toward the end of the wet season, also, many small rivers are made navigable, and the navigable stretches of the larger waterways are increased, so that, for some time after the rains have ceased, water communication is still possible with points that later in the dry season can only be reached overland and by a much greater expenditure of effort, time, and

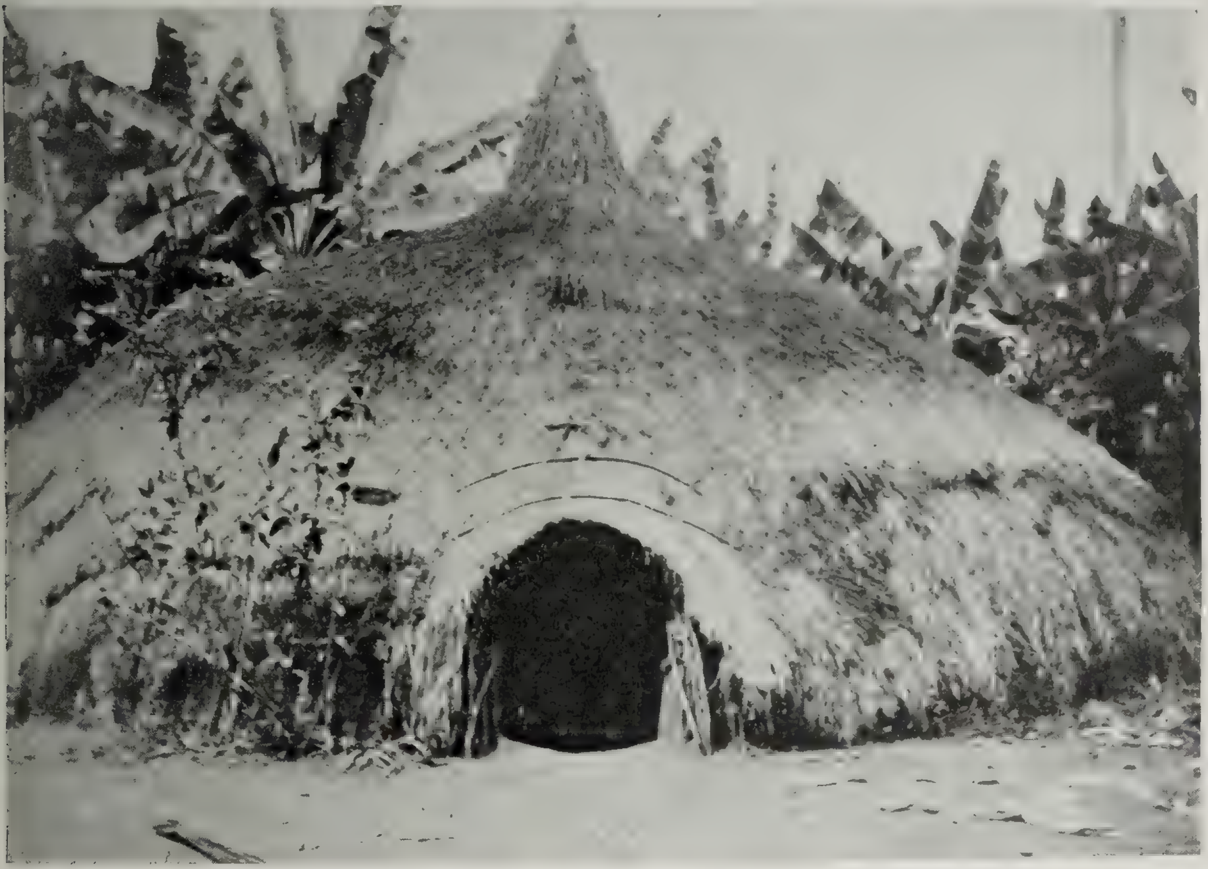


FIG. 2—Native architecture, adapted to the heavy rainfall. The thick thatch roof is brought practically to the ground as a protection to the mud walls.

money. When water communication is cut off, transportation to such points is usually on the heads of native porters. This is expensive. On the basis that an average porter carries 60 pounds 15 miles a day for 25 cents, the ton-mile cost of this means of transportation is over 55 cents—a charge that ordinarily prohibits transportation from a locality very far distant from a waterway.

An interesting illustration of the effect of the rainy season on food supply is a custom in vogue before imported salt was available. During the dry season each large town in the Liberian hinterland used to send a delegation down to the coast, 250 miles away, to "cook salt," as they phrased it, from the sea water in sufficient quantities to last the town until the succeeding dry season.

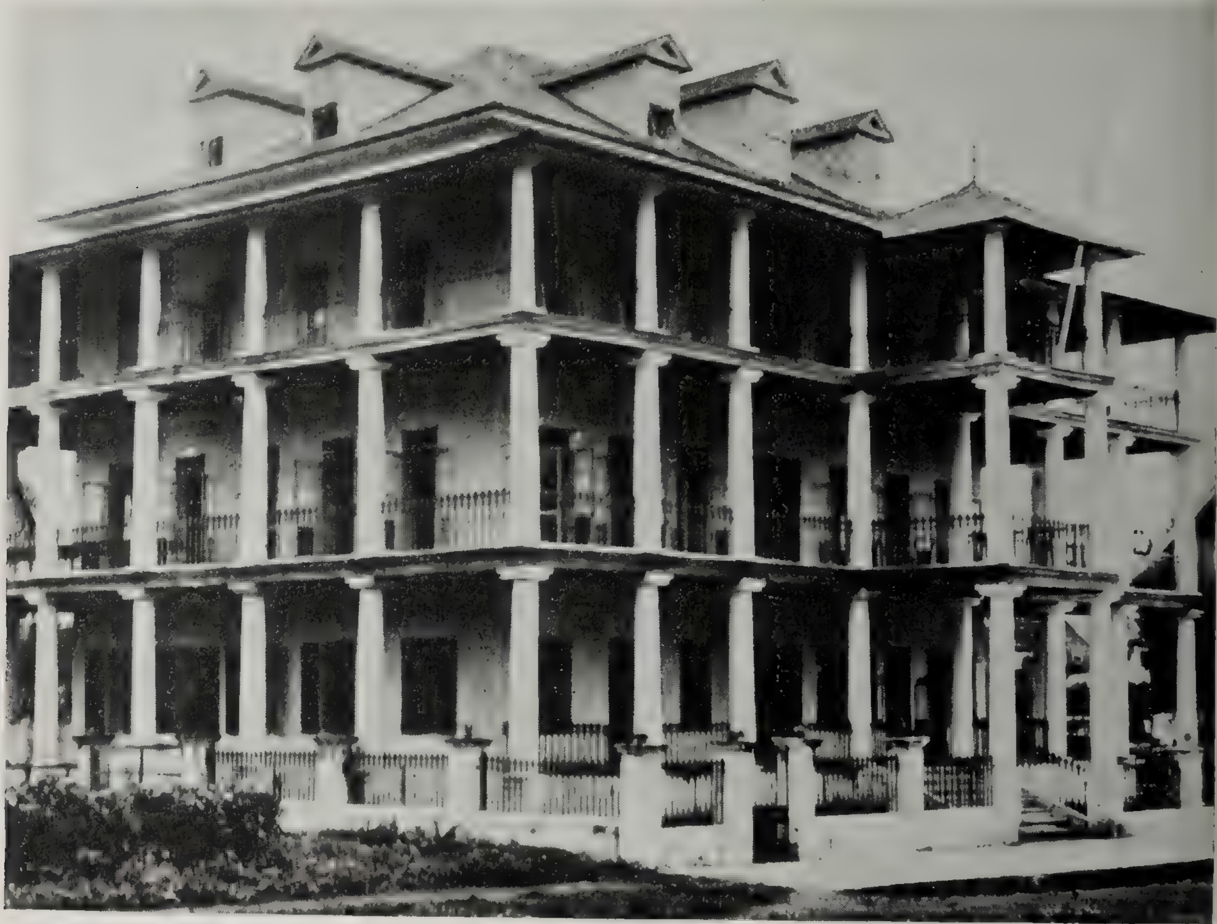


FIG. 3—Americo-Liberian architecture. Executive Mansion and home of the President of the Republic of Liberia at Monrovia.

The rains fill swamps, flood paths, wash away bridges, bring rivers out of their banks, sometimes in twelve hours or less, and in general upset the scheme of life worked out for the dry season. The rains have a direct effect on the style of native architecture. The houses, being of mud, are necessarily low and squat and of cramped dimensions so that a thick thatch roof of but medium size and within the power of one man, or of two or three, to make and to renew, will adequately cover it almost down to the ground all around and thus protect the mud walls from the soaking and disintegrating rains. Only the chiefs can afford the labor necessary to thatch and re-thatch, every second or third year, a really roomy house.

European Life on the West Coast

We may turn now to some considerations especially touching the life of Europeans in Liberia and, by extension, along the West Coast in general. Houses for white men are commonly elevated on pillars two to six feet above the ground. The upper stories are used as the living quarters. The material of which buildings are constructed is usually corrugated galvanized iron, although concrete, stone, and brick are growing in favor and will continue to do so. Wood is scarcely ever used except for the necessary framing, both because prepared timbers and planks are expensive and difficult to get and because the most kinds of wood are little else than food for the misnamed ravager known as the white ant—in truth neither white nor ant. Railroads and telegraph and telephone lines were at first very hard to maintain because of these same termites, which have long since forced the use of steel for ties and poles along the right of way.

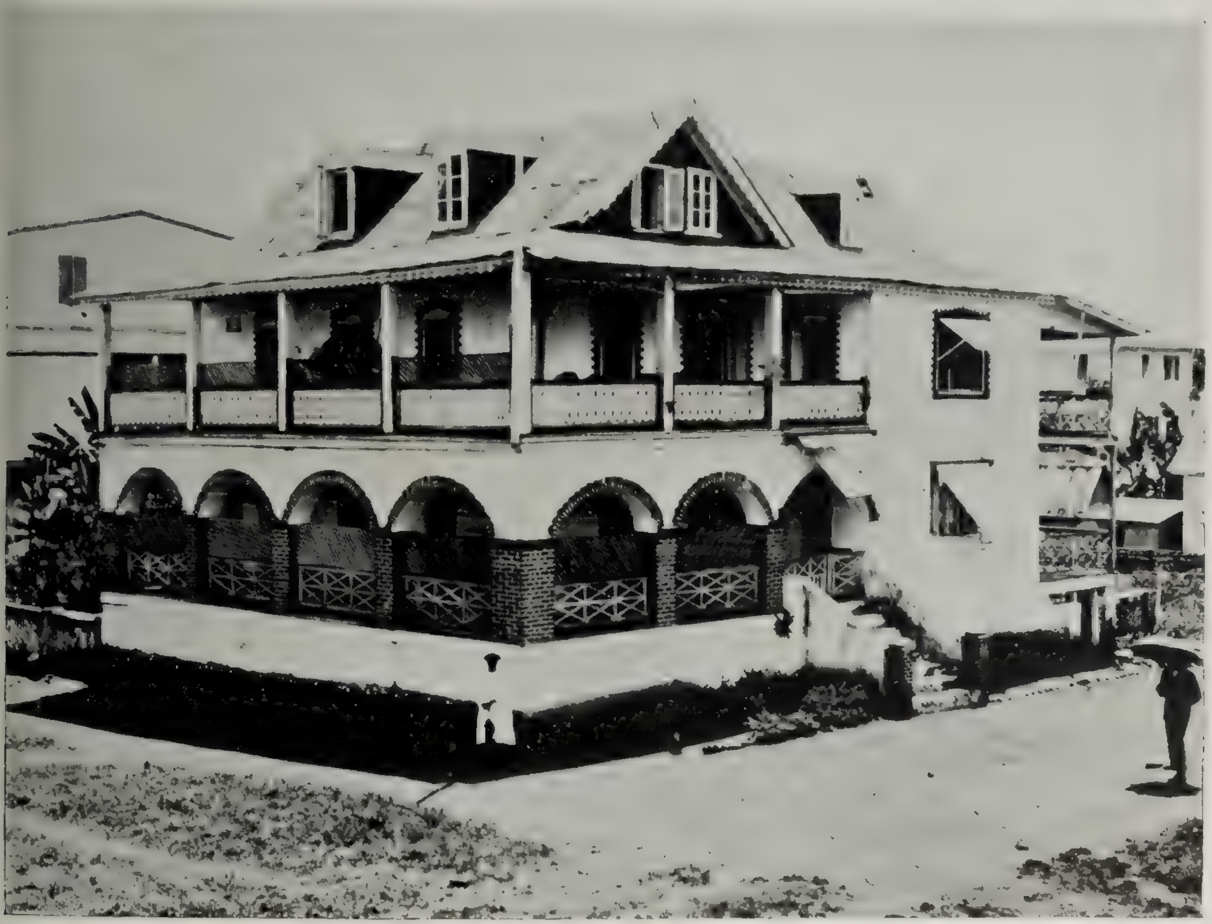


Fig. 4—Americo-Liberian architecture. United States Legation, Monrovia, Liberia.

Climatic conditions largely determine the foods the European shall eat, both imported and local. The latter are limited to what the native knows how to raise for himself or what the European has the time and knowledge to attempt to raise, and in both cases the climate has set a limit. This limit permits the raising of some few sorts of foods to which the European has become accustomed in his home country but prohibits the raising of a good half or more of such foods. Rice, bananas, plantains, palm oil, sugar cane, manioc, breadfruit, coffee, coconuts, nubbins of corn, and greens of various sorts about make up the native vegetable diet. The European or Americo-Liberian may add beans, carrots, watermelons, turnips, better corn, more kinds of greens, and maybe a few other articles if he has luck. But the staples which form his diet at home must be imported—potatoes, sugar, flour, oats, milk, butter, salt, cheese, tart fruits; and all those except potatoes must be put up in tins carefully and with special reference to hot and humid conditions. Sugar, flour, salt, etc., were tinned in normal times by a large New York wholesale grocery house at the rate of 4 cents a pound. A barrel of flour costing $7 originally would be worth $15 when put up in the usual seven-pound tins, before it even started on the long trip to its destination, expensive enough even before the war. In 1918 a grocery consignment invoiced at $700 by a Chicago mail order house cost the consignee, laid down at his West African coast port, in charges for rail and ocean freight and marine and war-risk insurance, an additional $750, making a total of $1,450 for the order—and it had still to be transported by rail and river 900 more miles to his interior station and to pay in addition an ad valorem customs duty of 12½ per cent. The expense and difficulty of securing imported foodstuffs, even in times of peace, and the lessened nourishment contained in preserved tinned goods, make the climatic control of local crops a very real thing to the white man. He is often compelled to rely so absolutely on tinned food that one of the native pidgin-English equivalents for the phrase "to prepare a meal" is "to kill a tin"!

TROPICAL HYGIENE

Personal hygiene in the tropics is a rather different and more painstaking matter than in the native home of the white man. In the humid tropics the white man cannot do sustained manual labor. Knowledge of that fact has attained the standing of a maxim on the West Coast, and if any further proof were needed it would be furnished by the evident inefficiency of the brave and willing European and South African troops of the line in the various tropical African campaigns of the war, as compared with the unremitting service rendered by the native soldiers drawn from Senegal, Nigeria, the Belgian Congo, and East Africa. Houses for white men have to be well screened with fine-mesh wire, and an equally fine-mesh mosquito tent covers every bed. Woolen blankets and light woolen underwear for those whose skin is not thereby irritated are proper things to have. To eat oftener and less heartily than in the homeland, is probably a good rule. Exercise is absolutely necessary, no matter how contrary it may be to one's inclination. All men qualified to discuss the matter agree that even moderate alcoholic indulgence is a wholly bad thing in the tropics. The red blood corpuscles are measurably thinned out, partly by the decreased supply of oxygen that the respiratory system gets; and this anaemic tendency is aggravated by malaria and by quinine—both by the disease and its specific, since malaria and quinine each tend to destroy the red cells.

Malaria and dysentery are endemic; yellow fever, plague, cholera, and smallpox have not occurred in Liberia for years. Sleeping sickness and the species of tsetse fly that is believed to carry this disease are both present in the republic, the fly in great quantities along its usual haunts, the river banks; but of sleeping sickness itself there have been only half-a-dozen instances in as many years. Europeans are rarely affected by the trypanosome in any case. Haematuric, or black-water, fever, following long-continued attacks of malaria, is probably the most dreaded of West Coast ills. Quinine has attained almost to the rank of a food on the West Coast; practically every European dining table has its bottle of the drug, and guests are offered one of the bitter tablets as a matter of course. Ordinarily a white man takes five grains a day as a prophylactic measure. In case of actual fever the dose is increased. The writer administered as much as 46 grains in 20 hours to a fever victim, but that was probably an excessive dose.

Dysentery must always be guarded against; a condition of perspiration, followed by injudicious cooling in a breeze and a consequent chilling of the abdomen, are the external circumstances that especially favor dysentery. Some Europeans, for the protection of the abdomen from chills, are compelled to wear a cummerbund—several feet of wide woolen belting wound around the body. The few European children on the coast appear to do fairly well for the short time they are there, but one may be sure that every season a child spends on the West Coast will be at the later cost of vitality that may handicap him for life. The various sorts of intestinal worms affect children greatly. European women do not withstand coast conditions as well as do men. Their more sensitive nervous system is particularly likely to be affected.

The Nervous Strain of the Tropics

This matter of nervous and mental make-up brings us to the final consideration of this paper. Along with the trying conditions of climate and disease go a host of pests and constant recurrences of life's little irritations. Moths eat up clothing; cockroaches devour bookbindings and nest in the cookhouse; rats climb to impossible locations and leave nothing but the fragments of what they have eaten there; white ants consume the sills of houses and the rungs of chairs; driver ants sweep through the house, and every other living creature therein must vacate, from the lord and master down to the lurking lizard, even if it be in the dead of night or the midst of rain; jiggers bore in under the skin of the foot and lay their eggs; fleas bite; the heat produces rash against which the lightest clothing feels like nettles; dhobie's itch makes its appearance and acts as if it had taken up its permanent residence. These things and the proverbial one thousand and one others like them are real and irritating at any time, but through the blur of a "touch of sun" or the haze of a burning fever they assume proportions out of all reason. The odors, the mists, the sights, the sounds get on the nerves; the heavy, drooping, silent, impenetrable green forest everywhere shuts one in like a smothering grave; the mind grows sick, and the body follows. For these reasons, largely mental, no one should stay on the West Coast longer than eighteen months at a time.

The writer has cited many things in this paper that do not bear directly on climate, in an attempt to point out a few of the influences that, connected with an unusual and inhospitable climate, combine to make acclimatization at present all but impossible. His feeling is that, if the earth's increasing population makes the acquisition of additional cultivated land areas of sufficient importance to justify the immense efforts that would be necessary for the sanitation of tropical countries, acclimatization of the white man to those countries would be possible. This means, of course, that the present bar to such acclimatization is mainly disease rather than climate. At present the relation of whites to the African West Coast can only be one of tolerance.

THE UNEXPLORED MOUNTAINS OF NORTH AMERICA

By **ALLEN H. BENT**
Appalachian Mountain Club

American mountaineering has had an interesting past and promises to have a brilliant future. Rock climbs, snow peaks, volcanoes, mountains rising from the ocean and from the desert—they are all here, like the bright seraphim in endless row.

THE TORNGATS OF LABRADOR

While most of the high mountains of North America are in the West there is one wild group in the East, the Torngat Range, in northern Labrador, which has the distinction of being one of the oldest mountain chains in America. The Eskimo word *torngat,* meaning ''bad spirits'', is justified. ''A single view of the bare, forbidding, riven, and jagged cliffs of the sawtooth ridges and alpine horns, whether seen in the interior or springing their thousands of feet from salt water in the fjords, leaves no wonder at the name,'' says Grenfell.[1] The highest part of the range, rising directly from the sea in latitude 59° N., is believed to be over 7,000 feet. Professor A. P. Coleman, former president of the Alpine Club of Canada, has done a little pioneer climbing there, attaining summits of over 5,000 feet,[2] but the range is practically unknown to mountaineers. There are many small living glaciers at the cirque heads of the highest valleys.

HIGH PEAKS IN THE WESTERN UNITED STATES

Probably most of the mountains over 10,000 feet in the United States—and they are numerous—have been climbed at least once, though many are far from accessible. The surveyors of the U. S. Geological Survey go almost everywhere, without making much ado about it, either. Mining prospectors are another hardy race that engage largely in mountain exploration, though for obvious reasons they do not often leave any printed record of their work.

The culminating heights of California, Oregon, Washington, Colorado, Arizona, and perhaps Idaho and New Mexico, are climbed every summer. There is, for instance, a saddle trail from Flagstaff nearly to the top of San Francisco Peak, the highest in Arizona. But the highest peaks of Montana, Wyoming, Utah, and Nevada, the first nearly 13,000 feet, the others more than that, are hardly known by name outside their respective states.

---

[1] W. T. Grenfell and others: Labrador: The Country and the People, New York, 1913, p. 100.

[2] A. P. Coleman: Mt. Tetragona, *Canadian Alpine Journ.*, Vol. 7, 1916, pp. 5-11; *id.:* Two Climbs in the Torngats, *ibid.*, Vol. 8, 1917, pp. 34-42. Cf. *Geogr. Rev.*, Vol. 4, 1917, p. 58.

Montana's highest mountain, Granite Peak (12,847 feet), in the southern part of the state northeast of the Yellowstone National Park, is in a region that has not yet been mapped, though preliminary surveys have been made. The nearest stations would seem to be Columbus or Big Timber on the main line of the Northern Pacific Railway. Northwest of the latter place is an isolated group of saw-toothed peaks, bearing the singular name of the Crazy Mountains.[3] Rising 7,000 feet above the railway (11,000 feet above sea level) they form a striking picture seen from the plains.

Speaking of strange names recalls the manner in which the Siskiyou Mountains in northern California and southern Oregon received their baptism. Some French-Canadian trappers from the Hudson's Bay Company post on the Columbia River had strayed down within sight of the northern end of this range. Their ford over the river they named "Six Cailloux" (six stones) and from that the settlers named the mountains, making a name that looks as though it were of Indian origin. "Wasatch" (Osage) and "Ozark" (Aux Arcs) are similar cases of perverted French names.

Gannett Peak (13,785 feet), in the Wind River Range, is the highest summit in Wyoming. It is not a difficult peak but is rather a long way from railroads—Lander, at the end of the Lander branch of the Chicago and Northwestern Railway, being the nearest point.

Hyndman Peak (12,078 feet), the highest in Idaho, is in the Sawtooth National Forest about twenty miles northeast of Hailey Hot Springs, which is on the Wood River branch of the Oregon Short Line Railroad. The next peak to the northwest bears the name of the Devil's Bedstead. These are in a mining and sheep-grazing region. Fifty to a hundred miles farther north are the Salmon River Mountains, with big game, far from all railroads.

The Wasatch and Uintah Ranges

Although Utah has been more thoroughly mapped by the U. S. Geological Survey than any other of the far western states, most of its mountains, except those of the Wasatch Range, which culminates at 11,900 feet, are inaccessible and seldom climbed. The Uintah Range in the northeastern part of the state, remarkable for running east and west, has the highest peaks—King's Peak (13,498 feet), Emmons Peak (13,428 feet), and Gilbert Peak (13,422 feet). All three of the men, Clarence King, Samuel F. Emmons, and G. K. Gilbert, whose names are thus perpetuated, were prominent in the early government surveying expeditions. Several towns, Roosevelt among others, have sprung up in recent years in the Uintah basin south of the range, and from some one of these, perhaps Vernal, where the supervisor of the Ashley National Forest has his headquarters, it would be necessary to outfit with pack train. The forest supervisor of the region is generally the best man from whom to obtain information of this sort. Roosevelt and Vernal are reached by automobile stage from Helper on the main line of the Denver and Rio Grande Railroad, or from Mack on a branch of the same road. From the north the range can be reached from Carter in southern Wyoming on the Union Pacific Railroad. It is evidently an interesting range, for F. V. Hayden, chief of the Geological Survey many years ago, wrote most enthusiastically about it: "In the artistic sense no range that I have seen on this continent can compare with it in beauty."

---

[3] M. R. Campbell and others: Guidebook of the Western United States, Part A, The Northern Pacific Route, *U. S. Geol. Survey Bull. 611*, Washington, D. C., 1915; reference on p. 86.

Mountains of the Desert Region

The La Sal Mountains near the Colorado boundary also reach elevations of 13,000 feet. The other mountains of Utah, those of Nevada and Arizona, as well as those in the southern and western part of New Mexico and in southern California, rise from the desert. They do not attract many climbers, though John Muir, who seems to have gone almost everywhere, had a good time climbing in Nevada.

In southern Utah the Abajo and Henry Mountains both have peaks over 11,000 feet, and near the Arizona border is the lonely and fascinating Navajo Peak (10,416 feet), four miles from which, in one of the most inaccessible parts of the United States, two hundred miles from a railroad, was discovered in 1909 the great Rainbow Natural Bridge.

Wheeler Peak (13,058 feet) was long supposed to be the highest in Nevada. It is in the Snake Range in the eastern part of the state—a part that has not yet been mapped. It commemorates Major George M. Wheeler, who, as a member of the Corps of Engineers of the United States Army, was engaged in surveying in the state from 1871 to 1879.

There are many peaks over 10,000 feet scattered over the state, all rising from the desert. Recently Boundary Peak, in the northern part of the White Mountains close to the California line, has been found to be slightly higher (13,145 feet) than Wheeler Peak. These are the highest of the desert mountains.

Mountains of Nevada and Eastern California

The East Humboldt, or Ruby, Range, perhaps the most rugged mountain mass in Nevada, is seen from the trains of the Overland Route beyond the town of Wells, sixty or seventy miles west of the Utah line.[4] A number of the peaks are from 11,000 to 12,000 feet, the railroad here being just about a mile above sea level. The crest of the range is included in the Humboldt National Forest.

The greater part of the White Mountains just referred to lies in Inyo County, California. The range, in which some mining has been done, is included in the Inyo National Forest. It is seen from the eastern heights of the Yosemite National Park. The Keeler branch of the Southern Pacific Railroad runs through Owens Valley, which separates this range from the Sierra Nevada, and a toll road to Deep Spring Lake crosses the southern end of the range at a height of over 7,000 feet. The Inyo Mountains, also over 11,000 feet, continue the range to the south to Owens Lake, an alkaline lake 3,569 feet above the sea.

---

[4] W. T. Lee and others: Guidebook of the Western United States, Part B, The Overland Route, *U. S. Geol. Survey Bull. 612*, Washington, D. C., 1915; reference on p. 163.

The Panamint Mountains, another range in eastern California, southeast of the White Mountains, rise west and south above Death Valley, the lowest point of which is 280 feet below sea level, the lowest part of the United States. Telescope Peak (11,045 feet), its highest point, is about seventy-five miles from Mt. Whitney, the highest mountain in the United States, and a little south of east from it.

MOUNTAINS OF ARIZONA AND NEW MEXICO

The White Mountains of Arizona, mainly in the Apache Indian Reservation, many miles from railroads, contain, according to Dillon Wallace, the largest primeval forest in the United States. They are reached by a daily stage from Holbrook to Fort Apache near the center of the reservation. This reservation, of some five thousand Indians, is 95 miles north and south and 70 miles east and west. Holbrook and Fort Apache are about 5,000 feet above sea level, and the highest point of the range, Thomas Peak, is 11,496 feet. Mr. Wallace, who made a circuit of this peak, says its scenery is "unsurpassed for variety and tone,"[5] to say nothing of its being a sportsman's Eden. An Apache superstition prevents the Indians from catching trout or shooting wild turkey. Deer, bears, mountain lions, and wildcats are numerous, and there are still mountain sheep.

There is a Sierra Blanca (White Mountain) in New Mexico, which state has also a Black Range with at least two peaks over 10,000 feet. One of these, Yellowjacket Peak, carries the color scheme a little further, though it was probably named after an exciting combat with a familiar winged insect—a combat in which firearms were useless.

PEAKS OF THE SIERRA NEVADA

In 1907, when Joseph N. Le Conte wrote "The High Sierra of California," the first of the American Alpine Club's publications—a monograph that every lover of these mountains ought to possess—he reminded us that there were still virgin peaks in the Sierra Nevada. A year or two afterward Professor Le Conte and his friend, James S. Hutchinson, made the first ascent of one of these, Mt. Abbott (13,700 feet), after finding it inaccessible from two sides; but, so far as the writer knows, only one of the Evolution Group, a fine group 13,000 feet high, has ever been ascended. The same is true of the Palisade Group, which is still higher (13,700 to 14,200 feet), and of the Kaweah Peaks. The North Palisade and Humphreys Peaks (each over 14,000 feet) have been ascended but once, by Le Conte and Hutchinson. ''The Palisades,'' says Professor Le Conte, ''furnish the very finest field in the Sierra for the mountain climber. . . . The eastern side is a sheer drop of several thousand feet, and at the base of the cliff are several residual glaciers.''[6]

---

[5] Dillon Wallace: Saddle and Camp in the Rockies, New York, 1911, p. 42.

The Canadian Rockies

Mountaineers have been busy making first ascents in the Canadian Rockies since the opening of the first transcontinental railroad across Canada and have already climbed the peaks nearest the two newer railroads in the region farther north; but the range is fifteen hundred miles long, and there is plenty of new work for the climber with a pack train.[7] What is probably the next to the highest of the Canadian Rockies, Mt. Sir Alexander (12,500 feet), was not attempted, approached, or even named until 1914, although Mr. R. W. Jones, when surveying for possible passes for the Grand Trunk Pacific Railway, had seen it ten years before; but he was looking for low passes, not high mountains, and so said nothing about it. Mr. S. Prescott Fay, of Boston, had seen it from a distance in 1912 and was the first to map and photograph it two years later. The same summer that Mr. Fay and his friend, Charles R. Cross, Jr., were exploring this big mountain, Miss Mary L. Jobe, of New York, made an attempt to climb it with Donald Phillips.[8] Mr. Fay found another fine peak, Mt. Ida, still farther north.

The main chain of the Rockies in the southern part of Canada averages sixty miles in breadth, running from southeast to northwest. On the southwest side is a long, deep trough occupied successively by the Kootenay, the Columbia, the Canoe, the Fraser, the Parsnip, and the Finlay Rivers of the Peace River system, and the Kachika of the Liard River system. To the west of this are more mountains, older than and different from the Rockies.

Near the United States are the Purcell and Selkirk Ranges, the latter conceded to be one of the most interesting ranges in the world. It is some four hundred miles long and, while three fine mountaineering books—W. S. Green's ''Among the Selkirk Glaciers'' (1890), A. O. Wheeler's ''The Selkirk Range'' (1905), and Howard Palmer's ''Mountaineering and Exploration in the Selkirks'' (1914)—are devoted exclusively to it, it still has many peaks awaiting the conqueror.

---

[6] J. N. Le Conte: The High Sierra of California (Alpina Americana No. 1), American Alpine Club, Philadelphia, 1907, p. 10.

[7] C. E. Fay: Recent Mountaineering in the Canadian Alps, *Geogr. Rev.*, Vol. 2, 1916, pp. 1-18.

[8] See S. P. Fay: The Canadian Rockies Between the Yellowhead Pass and the Peace River, *Appalachia*, Vol. 13, 1913-15, pp. 238-257; Mary L. Jobe: Mt. Kitchi: A New Peak in the Canadian Rockies, *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 481-497, with colored map, 1:300,000. For a fine picture of Mt. Sir Alexander see Mary L. Jobe: A Winter Journey Through the Canadian Rockies, from Mt. Robson to Mt. Sir Alexander, *Appalachia*, Vol. 14, 1916-19, pp. 223-233.

The highest peak, Mt. Sir Sandford (11,590 feet), has been climbed only once, by Mr. Palmer and his friend, E. W. D. Holway, with two Swiss guides in June, 1912.

THE CARIBOO RANGE

Still farther west is the lower Gold Range, or Columbia Range, as it has been called in recent years. This is not important; but its northern continuation, the Cariboo Range, is one of the most interesting fields for the mountaineer. The surveyors for the first Canadian transcontinental railway explored most of its passes, but their work was soon forgotten, and it was not until 1916 that Professor Holway and Doctor Gilmour made a beginning with ice axe and rope.

In his account of ''The Canadian Rockies North of Mt. Robson'' J. Norman Collie says of the Cariboo Range: ''My first view of them from a peak we climbed in 1910 in the Moose Valley astonished me. Mumm had seen them in 1909 . . . . . They are bigger and finer than the Selkirk Range as seen from the Rocky Mountains near Laggan. Two peaks that I have seen many times are especially fine, one a snow peak, and the other much sharper and with a good deal of rock on it. There is also a great glacier coming from the middle of the range eastwards. In shape these Cariboo Mountains are more rugged, wild, and beautiful than those in the Rockies. This one would expect, for they are made of the harder crystalline rocks and not of limestone . . . . the Cariboo Mountains are no minor group, but will yield to their explorers some of the finest peaks, some of the grandest scenery, and some of the most interesting geological information to be obtained in Western Canada.''[9]

THE COAST RANGE OF BRITISH COLUMBIA

West of the Gold and Cariboo Ranges is the Coast Range of British Columbia, continuing up into the Yukon Territory and the panhandle of Alaska. It is nearly a thousand miles long altogether. The mountains, although not many of them are over 9,000 feet, rise from sea level, are in a region of much precipitation, and have many fine glaciers, some of them coming down to the sea. It is a magnificent chain, as everyone who has threaded the inland channel from Vancouver to Skagway knows, a region of beautiful fiords and scenic wonders.

The range averages a hundred miles in width, dropping off on the east to an uneven plateau, about 3,500 feet above the sea. It is practically untouched by mountaineers. The British Columbia Mountaineering Club of the city of Vancouver is doing good work in exploring the southern end and has opened up some wonderful scenes. John Muir's book, ''Travels in Alaska,'' has a glowing account of an ascent he made in 1879 from

---

[9] J. N. Collie: The Canadian Rockies North of Mt. Robson, *Appalachia*, Vol. 12, 1909-12, pp. 339-349; reference on p. 346.

Glenora on the Stikine River (spelled "Stickeen" by Muir), in British Columbia, about one hundred miles north of Wrangell. Glenora Peak he estimated to be about 7,000 feet in altitude, and of the view he says: "I never before had seen so richly sculptured a range or so many awe-inspiring inaccessible mountains crowded together" . . . "more than three hundred miles of closely packed peaks of the great Coast Range . . . their naked tops and dividing ridges dark in color, their sides and canyons, gorges, and valleys loaded with glaciers and snow. From this standpoint I counted upwards of two hundred glaciers . . . Alps rise beyond alps as far as the eye can reach . . . Everywhere the peaks seem comparatively slender and closely packed, as if Nature had here been trying to see how many noble, well-dressed mountains could be crowded into one grand range."[10]

The highest mountains of Vancouver Island, over 7,000 feet, in a region of beautiful lakes, have been set aside in recent years by the government as Strathcona Park. The chain of which these are a part extends through practically the whole of the island, which is 290 miles long. It is a submerged range entirely surrounded by deep water, but even so it makes a magnificent showing.[11]

MT. LOGAN

The highest mountain in Canada is not in the Rockies but in Yukon Territory near Alaska. It was discovered in 1890 by Israel C. Russell in his first attempt on Mt. St. Elias. He says: "The clouds' parting toward the northeast revealed several giant peaks not before seen, some of which seem to rival in height St. Elias itself. One stranger, rising in three white domes far above the clouds, was especially magnificent. As this was probably the first time its summit was ever seen, we took the liberty of giving it a name. It will appear on our maps as 'Mt. Logan,' in honor of Sir William E. Logan, founder and long director of the Geological Survey of Canada."[12] The height he estimated at 19,500 feet, and now, thirty years later, it is still unclimbed.

THE ROCKY MOUNTAINS NEAR THE ARCTIC CIRCLE

Elihu Stewart, formerly Superintendent of Forestry for Canada, in his book "Down the Mackenzie and Up the Yukon in 1906," tells of going from Fort McPherson (the most northern of the Hudson's Bay Company's posts, near the delta of the Mackenzie in latitude 67°) down Stony Creek (La Pierre) to the Rocky Mountains, which he crossed some 60 miles north of the Arctic Circle at a height of 2,600 feet, the mountains rising 2,000 to 3,000 feet higher still. Of the journey down the Pacific side in late July he wrote: "We passed over some snow on the hillsides, but with-cut the least difficulty, as it was almost as hard as ice . . . . The mountain scenery here was very beautiful, though the peaks are not so high as further south . . . . No large glaciers are to be seen in this region, but considerable snow remains the year round on some of the peaks.''[13] He was five days in covering the eighty miles from Fort McPherson to Bell River, a tributary of the Porcupine which flows into the Yukon at Fort Yukon.

---

[10] John Muir: Travels in Alaska, Boston and New York, 1915, pp. 93-94.

[11] A number of articles on Strathcona Park are to be found in the *Canadian Alpine Journal*, Vol. 5, 1913.

[12] I. C. Russell: An Expedition to Mt. St. Elias, Alaska, *Natl. Geogr. Mag.*, Vol. 3, 1891, pp. 53-200; reference on p. 141.

The Alaskan Rockies

When the Rocky Mountains and the Coast Range, after their journey of hundreds of miles in a northwesterly direction, reach the international boundary they turn to the west and later to the southwest across Alaska in two crescents, from two hundred to three hundred miles apart, the great mesa-like plain of the Yukon River and its tributaries separating the two systems which have marched along so majestically together from the southland.

Of the extreme north Vilhjálmur Stefánsson, in ''My Life With the Eskimo,'' says: ''The low, coastal plain of northern Alaska is triangular in shape, with its apex at Point Barrow, perhaps two hundred miles north from the base, which is formed by the east and west running Alaskan spur of the Rocky Mountains, which comes within a few miles of the coast in eastern Alaska at the international boundary and meets the ocean in western Alaska at Cape Lisburne. . . . Their distance from the sea is not more than six or eight miles at Demarcation Point, while their highest places are probably about 10,000 feet in elevation and lie southward from Flaxman and Barter Islands, where they contain a few small glaciers.''[14]

The Arctic Range is sometimes called the British Mountains. Thomas Riggs, Jr., engineer to the Alaska Boundary Commission, thinks the higher summits are only about 7,000 feet high and says they are bare of snow in summer, as well as barren of timber.[15] This continuation of the Rocky Mountains in Alaska has various names, ''Endicott'' being applied to the central part of it and ''Baird,'' ''Waring,'' and ''DeLong'' farther west. The Davidson Range (south of the Arctic Range), discovered in the winter of 1890 by J. H. Turner, of the Coast and Geodetic Survey, while surveying the international boundary, was named after George Davidson (1825-1911), the first United States government surveyor to explore the Alaska mountains (1867). The mountains of this range reach a height of 5,000 to 6,000 feet and extend many miles both east and west of the boundary. They are densely wooded with pine trees, some of which attain a height of forty to fifty feet. The journey of the explorers from their camp, about one hundred and twenty-five miles north to the Arctic Ocean, was made in March, the thermometer sometimes reaching 50° below zero.[16]

---

[13] Elihu Stewart: Down the Mackenzie and Up the Yukon in 1906. London and New York,1913. p. 124.

[14] Vilhjálmur Stefánsson: My Life with the Eskimo, New York, 1913, pp. 65, 66.

[15] Thomas Riggs, Jr.: Surveying the 141st Meridian, *Natl. Geogr. Mag.*, Vol. 23, 1908, pp. 685–713.

[16] John Bonner: Alaskan Exploration in 1891, *Californian Illust. Mag.*, Vol. 1, 1892, pp. 243–254.

Mt. McKinley and Mt. Foraker

Alaska has the highest mountain on the continent—Mt. McKinley, Tennali, or Denali, as you prefer (20,300 feet or 20,700 feet)—the tallest snow mountain in the world, for the perpetual snow line here is not far from 2,000 feet above sea level. Since 1903, when first attempted, it has been the scene of considerable activity, and four books have been devoted entirely to it. The near-by Mt. Foraker, or Denali's Wife, rising 17,000 feet above the sea, still stands an "imperial votaress . . . in maiden meditation, fancy-free."

The view of these two great mountains, seen from Lake Minchumina only 1,500 feet above sea level, is stupendous in its majesty, says Archdeacon Stuck.[17] May the government railroad be soon completed, so that more of us may glimpse these two great mountains!

Other Alaskan Peaks

Of the peaks of the magnificent range rising for nearly three hundred miles along the ocean Mt. St. Elias (18,024 feet) is the only one that has been climbed. Mt. Logan, the highest of the range (19,500 feet), in reality stands back from the rest and is just over the border in Canadian territory; but there are other dazzling peaks (the snow line is from 3,000 to 4,000 feet above the sea) to tempt the ambitious—Mt. Vancouver (15,676 feet), Mt. Hubbard (14,950 feet), Mt. Cook (13,755 feet), all near to St. Elias, and Mt. Fairweather (15,399 feet), Mt. Crillon (12,727 feet), and Mt. La Pérouse (10,756 feet), farther south. West of Mt. St. Elias the range divides, the lower Chugach Range (culminating in Mt. Gilbert, 10,194 feet) following the coast around Prince William Sound to the Kenai Peninsula, the other, the Wrangell Range, running northwest to the Copper River, culminating in Mt. Sanford (16,208 feet). Mt. Blackburn, the second in height (16,140 feet), was conquered by Miss Dora Keen[18] (now Mrs. Handy) in May, 1912. Mt. Wrangell, the only active volcano in the range, was climbed by Robert Dunn in July, 1908. There are five or six other peaks that rise over 10,000 feet.

The great Alaska Range, of which Mt. McKinley is the culminating point, extends from the Copper River in a great broad crescent westward for five hundred miles or more, well back from the coast. It has many high peaks, though none of them approach McKinley and Foraker.

The surveyors of the boundary commission that has recently marked out the line running north six hundred miles from Mt. St. Elias to the Arctic Ocean found, eighty or ninety miles north of St. Elias, a lonely and majestic snow peak, Mt. Natazhat (13,480 feet), crowning the top of an east-and-west range of the same name. This peak was climbed in June,

---

[17] Hudson Stuck: Ten Thousand Miles with a Dog Sled, New York, 1914; *id.*: The Ascent of Mount Denali (Mt. McKinley), New York, 1914.

[18] See Dora Keen: First Up Mt. Blackburn, *World's Work*, Vol. 27, 1913, pp. 80-101.

1913, by H. F. J. Lambart and three companions, though it did not yield upon the first attempt nor was it in an exactly docile mood when it was finally conquered.[19]

The Aleutian Range, on the Alaska Peninsula and the Aleutian Islands, forms a long line of active volcanoes, the highest of them being Mt. Spurr (11,069 feet), Mt. Redoubt (10,198 feet), and Iliamna (10,017 feet).[20]

With all of these glorious heights before him the mountaineer may well pray for a long and vigorous life.

---

[19] See H. F. J. Lambart: The Ascent of Mt. Natazhat (13,480 feet) in Alaska (1913), *Canadian Alpine Journ.*, Vol. 6, 1914-15, pp. 1-10.

[20] On the mountains in the southern half of Alaska see especially the admirable monograph by Alfred H. Brooks: Mountain Exploration in Alaska (Alpina Americana No. 3), American Alpine Club, Philadelphia, 1914.

DRAINAGE EVOLUTION ON THE YÜNNAN-TIBET FRONTIER*

By W. M. DAVIS

A recent article[1] on the drainage conditions in the region where the Salween, Mekong, and Yangtze are compressed within a space of 50 miles in their flow southward from the Tibetan Plateau is a bold, not to say a venturesome application of deductive geomorphology in an effort to give explanatory description of the river courses in a lofty mountain region. The trend of the main ranges and valleys, as well as the strike of the nearly vertical rock structures, on the Yünnan-Tibet frontier is about north and south; but certain first-order tributary valleys, trending in part east or west, also turn to southward courses for part of their length; and, as it is assumed that such tributary valleys must originally have had wholly east or west transverse courses, an explanation for their southward turns is sought. The explanation proposed points out that the heavy rainfall comes with southwest winds and that the climatic control of vegetation on the higher slopes favors erosion on their windward aspects; it is therefore concluded that second-order tributaries, heading northward, would capture and divert the upstream parts of first-order tributaries farther north, and thus southward turns in the tributary drainage would be developed.

DISREGARD OF THE PRE-UPLIFT HISTORY OF THE REGION

The article is above characterized as bold, because it goes so much farther into deduction than is usual in British geographical essays; and for this the author deserves applause. The article is further characterized as venturesome, because the main postulate upon which its deductions are based is unwarranted; and for this the author ought to be cautioned. The unwarranted postulate is of a kind that is not infrequently met in the treatment of uplifted regions, in that it fails to take account of the form that the region had acquired by erosional processes before it was uplifted. It is here assumed without inquiry that "the natural course of every [first-order] tributary stream is [east or west] down the flank of the main divide"; that is that the mountain ranges, when first uplifted, had smooth lateral slopes, down which the first-order tributaries of the main rivers must have flowed in east or west consequent courses. In a word, the pre-uplift history of the region is not considered; no account is taken of a possible cycle of erosion preceding the current cycle. Yet, inasmuch as the general structure of the region is nearly vertical, and inasmuch as the features of the Tibetan Plateau farther north give many indications of geologically modern uplift after a prolonged period of erosion at a lower stand, the most reasonable assumption that can be made as to the pre-uplift form of the region is that it consisted of broad old valleys, drained for the most part by long streams well adjusted to belts of the least resistant rocks, between subdued hills and ridges of the most resistant rocks crossed by short transverse streams. In view of this manifest possibility, a reasonable inference as to the form and drainage of the region directly after uplift is that the pre-uplift form and drainage still persisted in a general way, although new slopes and reversals of drainage may have been introduced here and there by uplifts of unequal measure.

---

* One of a series of "Notes on the Description of Land Forms," the latest of which appeared in the March *Geographical Review*, pp. 176-180, where a complete list is given of the preceding instalments.

[1] F. Kingdon Ward: The Hydrography of the Yünnan-Tibet Frontier, *Geogr. Journ.*, Vol. 52, 1918, pp. 288-299. [For photographs showing the topography of this region see *Geogr. Rev.*, Vol. 6, 1918, pp. 3, 12, 13, and 17.—EDIT. NOTE.]

Probability of an Earlier Cycle of Erosion

Hence in this mountainous region, as in many others, the cycle of erosion that was introduced by the uplift to which the present altitude of the region is due is probably not a first cycle, previous to which no inquiry as to the development of river courses need be made. It is more reasonable to regard the erosion of the region as now in the early stages of a second cycle, at the beginning of which many river courses may have been inherited from a preceding cycle; and to regard the preceding cycle as having reached a far-advanced stage and as therefore having witnessed the adjustment of many streams to belts of weak structure. According to this view, a good number of the captures that are attributed by the author to the current cycle of erosion may well have taken place in the earlier cycle, and they may then have been determined more largely by variations of rock resistance than by the climatic factors which the author mentions as now operative. Unfortunately, the control exerted upon valley arrangement and form by resistant and weak structural belts is not recognized. Furthermore, the direction of the streams, and not the unlike resistance of structural belts, is taken to control valley width, as is seen in the statement that "as long as the stream follows the strike, the tendency is for it to cut a broad valley; when it cuts across the strike the tendency is for it to cut a narrow jagged-edged gorge." Again no account is taken of Campbell's principle, according to which the captures that have taken place during the current cycle may have been more largely influenced by a southward tilting of the region during its uplift—for the ranges decrease in height southward—rather than by climatic factors.

Hanging Valleys

Certain other items of interest may be noted. Waterfalls from hanging valleys are explained as due in some instances to the "overdeepening of the main valley by water while the tributary valleys were filled by ice''—a discredited process—and in other instances to the deepening of a main valley as a result of increase in its river volume by capture farther upstream; but a special feature, namely an extreme narrowness of the main valley, which should accompany waterfalls from tributaries thus left suspended, is not mentioned; nor is reference clearly made to the much more effective cause for hanging-valley waterfalls in mountainous regions that is provided by the glacial overdeepening of the main valleys, although allusion is made to the broadening of certain valley heads by glacial action.

Incised Meanders

One of the larger rivers turns ''backwards and forwards on itself, loop lying against loop in a deep gorge through a mountain range.'' Such looping ''would, of course, occasion no surprise in the case of a river meandering across a flood plain, but when it rushes through deep gorges . . . . the effect is staggering.'' A special explanation is therefore demanded; but in the explanation offered no account is taken of the very possible inheritance of the loop embryos from a meandering course developed during an earlier cycle of erosion, although such an explanation for the incised meanders of the Wye in western England, of the Seine in northwestern France, of the Meuse through the Ardennes, and of the Mosel between the Hunsrück and the Eifel has long been current.

Recent Renewal of Uplift

The term ''reversed'' is used in a new and peculiar sense, in being applied to a tributary valley that, unlike ordinary valleys, which are narrow toward the head and broadly opened farther downstream, is broadly opened at its head and narrowed to a chasm at its confluence with the deeply incised valley of its trunk river. It is suggested that the broadening of the valley head may have been accomplished by glacial erosion, but nothing is said as to the possibility of a recent renewal of uplift as a cause of the deep incision of the lower valleys. Thus the author, who is very properly more interested in his Far East field of observation than in a review of pertinent literature, has repeated, in his discussion of these several items as well as in his main discussion, the unadvisable course of certain American observers, who fifty years ago were so overwhelmed by the novelties of our Far West that they described them without reference to the explanations and the terminology that had been previously suggested for similar though less striking features by stay-at-home students in older-settled regions.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Presentation of the Cullum Geographical Medal to Emmanuel de Margerie. The presentation to Emmanuel de Margerie of the Cullum Geographical Medal, whose award to this eminent French geographer by the American Geographical Society was announced in the April *Review* (p. 262), took place at the United States Embassy in Paris on May 27. The presentation was made by Ambassador Hugh Campbell Wallace. In addition to members of M. de Margerie's family there were present representatives of various learned institutions of Paris as well as members of the American commissions at the time in the French capital, including Dr. Sidney E. Mezes and Professor Mark Jefferson of the American Commission to Negotiate Peace and Major D. W. Johnson.

In presenting the medal Ambassador Wallace made the following remarks:

''Ladies, Monsieur de Margerie, and Gentlemen: I have the honor to be requested by the Council of the American Geographical Society, and the very great pleasure, to be its representative in presenting the Cullum Gold Medal of the Society to M. Emmanuel de Margerie of Paris for his most conspicuous services to the science of geography. The international reputation of M. de Margerie makes unnecessary and superfluous any words of mine concerning his earnest and successful effort. No geographer or geologist in France has given so much assistance to the American Expeditionary Forces, and his co-operation with the Geographical Section of the Army will not be forgotten by any who have come in contact with it.

''Sir: It is with sincere appreciation of the privilege I enjoy in representing the American Geographical Society in such an entirely justified and pleasing recognition of your work that I beg you to accept this medal.''

The Ambassador thereupon presented the medal, the inscription on which reads as follows:

TO EMMANUEL DE MARGERIE
FOR ''LA FACE DE LA TERRE''
DISTINGUISHED FOR PROFOUND SCHOLARSHIP
AND THE RARE GRACE OF A MODEST SPIRIT

In accepting the medal M. de Margerie spoke as follows, graciously couching his remarks first in French and then in English, which he commands with perfect ease:

''Monsieur l'Ambassadeur: Aucun honneur ne saurait être plus agréable à un géographe français, en ce moment de l'histoire du monde, que d'être choisi comme lauréat par la grande Société de Géographie dont le siège est à New York.

''En m'attribuant l'une de ses deux médailles d'or, cette puissante association vient consacrer officiellement les liens d'échange intellectuel et d'affectueuse sympathie qui m'unissent, depuis bien des années, à de nombreux représentants de la science américaine.

''Qu'elle soit remerciée, par votre bouche, de cet acte généreux, dont les maîtres et les amis qui m'écoutent sentent certainement, comme moi, tout le prix, car, à travers ma modeste personne, c'est à mon pays que va ce témoignage si flatteur!

''En parcourant la liste des titulaires de la médaille Cullum, je suis particulièrement heureux d'y relever le nom d'un de mes compatriotes, le Dr. J. B. Charcot, et celui du plus éminent des géographes vivants des Etats-Unis, l'infatigable professeur W. M. Davis, dont tous, à des degrés divers, nous sommes les élèves.

''Mais je crains qu'une bienveillance excessive n'ait dicté à la Société sa decision, quand je vois pour me précéder tant d'hommes illustres, les Moreno, les Nansen, les Scott, les Shackleton, les Peary, et plusieurs autres, dont l'existence tout entière n'a eu qu'un but: faire disparaître de la carte du globe les taches blanches qui subsistaient avant leurs travaux.

''En effet, si les circonstances m'ont permis de fréquents voyages a l'étranger, je n'ai jamais parcouru que des routes très banales, et il n'y a pas un seul kilomètre d'itinéraires nouveaux qui puisse être versé au dossier de l'exploration en mon nom.

''C'est donc à un autre aspect des études géographiques que s'adresse l'insigne marque d'encouragement dont je suis, aujourd'hui, le bénéficiaire. C'est, si je ne me trompe, à la critique des idées et des faits, à la diffusion des résultats acquis, à l'élaboration des principes et des méthodes.

"Sans m'étendre sur la portée de cet effort, vous me permettrez d'insister sur le constant appui que j'ai trouvé, depuis près de quarante ans, auprès des savants américains et des institutions scientifiques qui font la gloire des Etats-Unis.

"Ever since the days of my boyhood the work of the scientific pioneers in the West has exerted on my thoughts and feelings a fascination of its own. It was my privilege, in 1891, to meet personally some of these great men: Dana, Whitney, Clarence King, Major Powell, Gilbert, Holmes, and several of their associates, and to receive, as it were, inspiration from their active genius. When, twenty-one years later, I had the honor to give an address, in English, to the members of the American Geographical Society assembled in New York, there could not remain any doubt in my mind as to the subject I was to choose: 'The Debt of Geographical Science to American Explorers.' If I have contributed to make better known some of their achievements among French geographers and geologists, that is a mere trifle in comparison with the benefit I have found myself in the perusal of their work.

"During the last three years I had more than once the pleasure of receiving the visit of friends from the other side of the ocean, most of them members of the Society, but not always identified at once under the military dress of the time. The very meager help I could give them in matters connected with their official duty gave me an occasion to see something of what 'American efficiency' could be, in those heroic days.

"I shall never forget the enthusiasm and unselfishness of these gallant men. Major Johnson, whom I am glad to see in this audience, can take for himself a good part of that compliment. Let me name also my friend Dr. Isaiah Bowman, whose departure from Paris, a short while ago, remains a source of deep regret to me—as he is responsible, I believe, for the delicate and most charming words engraved on the medal which I am receiving from the hands of Your Excellency.

"And now, Mr. Ambassador, let me add a few words to convey to yourself the expression of my deep personal feelings of gratitude and to excuse myself for having encroached upon your time in a moment when the hours are, perhaps, more heavy for responsible men than has ever been the case before.

"Vive la science américaine! Vive les Etats-Unis!"

NORTH AMERICA

The Deepest Well in the World: A New Record. Until very recently the two deepest borings into the crust of the earth were a well near McDonald, Pa., 14 miles west of Pittsburg, which measured 7,248 feet, and one at Czuchow in Upper Silesia, Germany, where a depth of 7,349 feet had been reached. These marks have now been passed by a well sunk near Clarksburg, in the northern part of West Virginia, in a futile attempt to reach the rich gas-bearing and petroliferous "Clinton" (Medina) sand, which extends across eastern Ohio and is thought to underlie this region. A final depth of 7,386 feet was reached. The failure to reach the oil and gas horizon was due to the unexpected thickening of the Devonian shales, one of the overlying series, and to the parting of the cable 2,000 feet above the bottom when this depth had been reached ("Discussion of the Records of Some Very Deep Wells in the Appalachian Oil Fields of Pennsylvania, Ohio, and West Virginia," by I. C. White, with temperature measurements by C. E. Van Orstrand: introduction to D. B. Reger: Barbour and Upshur Counties and Western Portion of Randolph County, *West Virginia Geol. Survey County Repts.*, 1918, pp. xxv–ciii).

Interesting data regarding the rate of increase in underground temperature have been yielded by the operation and by similar borings in the same field. It was found that at a depth of 7,000 feet the temperature had risen to 172° F. and that the rate of increase at that depth was about 1° F. in 51 feet. Mr. Van Orstrand estimates that the boiling point would be reached at somewhere near 10,000 feet below the surface. The rate of temperature increase (1° F. for each 51 feet of descent) is about the average ascertained by the Committee on Underground Temperatures of the British Association for the Advancement of Science (e.g. *Rept. for 1889*, pp. 35-40; *1895*, pp. 75-77; *1901*, pp. 64-71; *1904*, pp. 51-55), though the rate is far from uniform, varying from 1° F. in less than 20 feet to 1° F. in 130 feet. In this portion of the Appalachian district there has been little movement of the strata since their deposition, hence the temperatures recorded are of peculiar interest. For data regarding temperatures recorded in earlier borings in the same region see W. Hallock: Subterranean Temperatures at Wheeling, W. Va., and Pittsburgh, Pa., *School of Mines Quarterly*, Vol. 18, 1897, pp. 148-154.

The Vegetation of the Dry Tortugas. Among the "Papers from the Department of Marine Biology of the Carnegie Institution of Washington" in Vol. 12, 1918, is one (pp. 111-138) of peculiar geographical interest on the ''Botanical Ecology of the Dry Tortugas,'' by H. H. M. Bowman. It will be remembered that on one of these small islands, which lie 70 miles west of Key West, the Carnegie Institution maintains its Marine Biology Laboratory, established in 1904. These islets, ten in all, are of coral formation and have grown roughly crescent-shaped through the action of wind-formed currents, the Florida countercurrent, and the movement of tides. They rise only slightly above the surface of the water and vary little in either climate or soil. Except the general survey of the vegetation of the entire Florida Keys conducted by E. O. Lansing in 1904, the results of which were published in 1907 by C. F. Millspaugh (Flora of the Sand Keys of Florida, *Field Columbian Museum Publ. 118: Bot. Ser. 2, No. 5*), no other recent study of the vegetation of these islands has been made.

The flora of the Dry Tortugas is strikingly different from that of the keys farther east, partly because of their isolation, partly because of the character of the soil. The mangrove, a characteristic form in the other islets, is almost entirely lacking in the Tortugas, where both soil and air are too dry to favor its growth. All plants of the islands may be classified as strand flora. They owe their origin to the adjacent West Indies, from which they have probably been carried by the currents referred to. Contrary to the opinion expressed by Millspaugh, the author finds that birds have had little influence in the distribution of plant life. Though the Tortugas have been a United States Bird Reservation since 1908 and though they are densely populated with terns during the breeding season, the food upon which these birds subsist is chiefly fish, and they seem to have affected plant life only to a small extent.

As the islands possess no springs and as the soil is so porous that it retains little moisture nearly all plants show some special adaptation to guard against the loss of water.

The Associated Mountaineering Clubs of North America. The organization known as the Associated Mountaineering Clubs of North America was founded in 1916 with nine clubs and societies; there are now twenty-nine, with an individual membership of over 45,000. In addition to the leading mountaineering and outdoor clubs of the continent, the association includes some societies whose activities are of a somewhat different character. Uniting them all, however, there is the common bond of interest in the preservation of our finest scenery and in the protection of tree, plant, flower, bird, and animal life in its natural environment.

The association is working in co-operation with the National Park Service for the creation and development of our National Parks and Monuments. First in the hearts of all true mountaineers and travelers is the preservation of our most beautiful scenery from commercial ruination. In the annual *Bulletin* of the association attention is called to the activities of the various departments of the Government of value to the mountaineer and traveler. The claims of various regions to become National Parks and Monuments and the proposed enlargements of existing parks are presented. As these projects come up for governmental consideration the association presents the views of its members and also gives wide publicity to the plans of the Government.

The association acts as a clearing house for interchange of information on mountaineering and on National Parks and Monuments. Its *Bulletin* contains information as to the officers, number of members, dues, publications, outings, and other matters of interest, of the organizations belonging to the association. A large collection of literature has been formed, by combining, in the building of the New York Public Library, the books of the American Alpine Club and the mountaineering books in the New York Public Library, and bibliographies are being compiled and published. A collection of mountain photographs has been gathered to supplement the literature of various regions. Many mountaineering and outdoor books have been secured free of charge for the libraries of the members of the association. Public attention has been called to many important but little-known scenic regions by illustrated articles in leading periodicals and by illustrated lectures which have been given before many leading clubs and societies.

LE ROY JEFFERS

AUSTRALASIA AND OCEANIA

Hawaiian Climate and White Residents. Though it is a generally accepted idea that prolonged residence within the tropics impairs the vitality of the white race, Professor Vaughan MacCaughey, in an article contributed to *Science* (Jan. 10, 1919, pp. 44-46), maintains that there is little ill effect experienced in the Hawaiian Islands. Americans, even those families who have lived there for several generations, seem to retain the same vigor and energy as people in the ''States.'' Business hours, length of working day, holidays, and vacations follow the customs of the continental United States. School children and college students appear capable of doing work equal in amount and quality to that accomplished in the temperate zone. Though white labor does not now exist on the islands, yet in earlier days, before the advent of Oriental workmen, white men worked in the fields with no apparent ill effect. In energy, leadership, and intellectual activity the resident whites have suffered little, if any, deterioration.

Professor MacCaughey accounts for this by supposing that the oceanic influence, intensified by the presence of cool currents and strongly developed trade winds, which render the climate more truly temperate than tropical, counteracts any deleterious effect which life within the torrid zone might otherwise have. This contention is upheld by Dr. Titus M. Coan in his paper ''The Climate of Hawaii,'' published in Cohen's ''System of Physiologic Therapeutics'' (Vol. 4, pp. 223-241, Philadelphia, 1901). It serves as an excellent illustration of the fact that the true boundaries of zones are isothermal rather than latitudinal: that even within the tropics climatic conditions are often far from ''tropical.''

The Rainfall of Honolulu. In a recent paper on the cumulus clouds which form in the trade winds over the Koolau Mountains on the island of Oahu, Andrew M. Hamrick calls attention to the striking differences in the rainfall amounts within short distances on that island (*Monthly Weather Rev.*, Sept., 1918). If Oahu were a low, level island, it would be a desert. By a fortunate arrangement of the topography the Koolau Mountains lie at right angles to the trade winds and are of sufficient height to cause not only the huge cloud cap which is so striking a characteristic of the region but also a very considerable rainfall. In the business district of Honolulu, which is about 5 miles from the crest of the mountains and to leeward of them, the mean annual rainfall is about 25 inches. Three miles northeast of the city, about halfway to the summit of the mountains, it is 100 inches. The cloud, which hangs with remarkable steadiness over the mountains, is sometimes blown far enough to leeward to give rain in Honolulu, though the sun is shining brightly over that city. These showers are locally termed ''liquid sunshine.'' The moisture from the cloud cap favors the growth of dense vegetation on the mountains. Similar conditions are found on the other large islands of the group. Sufficient water is collected from the clouds to supply the irrigation ditches upon which most of the agriculture of the Hawaiian Islands depends.

R. DEC. WARD

OCEANS

The Meteorological Aspects of the Recent Transatlantic Flights. With transatlantic flight actually accomplished, the problem of intercontinental air voyages has apparently resolved itself into a question of selecting lines of travel where meteorological factors are favorable or of waiting for suitable weather conditions along a desired route. Machines are able to carry the required fuel, and aviators have proved themselves capable of the protracted strain involved. It will always be necessary, however, carefully to select the routes and the times that offer favorable meteorological conditions. This will be the case whether outlying points, such as St. John's and Trepassey Bay, be used for transoceanic air-service ports or whether, with the experience now being gained, it be possible to make the start from the great ports already developed as termini of steamer routes. A thorough consideration of meteorological conditions is requisite not only for the safety of machines and passengers but also because speed and the consequent cost in time and fuel for each voyage depend upon the force and the direction of wind and other favorable atmospheric conditions.

The *Monthly Weather Review* for February, 1919 (pp. 65-75), contains a discussion of ''Trans-Atlantic Flight From the Meteorologist's Point of View'' by W. R. Gregg, one of the meteorological experts actively concerned with the flight of the U. S. Navy planes. Though the subject is considered in relation to the then still unaccomplished first flight, the conclusions reached apply in a general way to succeeding voyages. Two routes only are considered of great present importance for the flight from North America to Europe; those taken respectively by the English and the American aviators in the journeys recently made. Though the route from Newfoundland to the Azores was considered most practicable for an initial venture because of the shorter distances to be covered in the individual ''hops,'' that from Newfoundland to Ireland is found to offer more suitable days in the year for the eastward flight. A careful comparison of meteorological conditions as revealed in the daily marine synoptic weather maps for the years 1906-1915, inclusive, showed that the northern route offers 127 days per year and the southern route 101 days per year favorable for the eastward voyage. For a return the southern route offers but 35 days annually and the northern route even less, containing on an average only 17 suitable days. However, all estimates of weather conditions high above the Atlantic are based chiefly upon free-air observations made in the eastern United States and western Europe, combined with our knowledge of surface conditions on the ocean, since few actual observations have been made in the upper air over the sea.

In flying over the ocean, at an elevation of from 500 to 1,000 meters, the temperature is likely to be quite constant throughout the year. In the upper air, as on the surface of the sea, there are not such extremes as on the land. Even during winter it is thought that the temperature at 1,000 meters above the sea seldom falls much below freezing, while throughout other seasons the temperature must be milder still and, of course, never high enough to cause discomfort from heat.

The meteorological conditions of greatest interest in transatlantic flying are wind (velocity and direction) and cloudiness (including fog). The experience of the American and British aviators in their transoceanic flying reveals the fact that the latter factor is of supreme importance. Fog and cloud are considered in Gregg's paper as of relatively slight import and are thought to affect only the matter of locating the landing place. This would seem to be the case, too, in the "Report of the British Civil Aerial Transport Committee" (London, 1918), since this treatise also discusses fog chiefly in relation to the difficulty in landing (see the note on this report in the *Monthly Weather Rev.*, Feb., 1919, p. 80). But practical aviators have encountered the difficulty of steering in clouds, finding it extremely hard to recognize either horizontal or vertical directions, if the compass card becomes unsteady, as often happens. Even the bubble is of little assistance, as centrifugal force counteracts gravity (see "Danger in Flying Through Clouds", abstract of a paper read before the Aeronautical Society of Great Britain by Captain B. C. Hucks, *Scientific American Suppl.*, June 15, 1918, p. 375). In fact the greatest difficulty encountered by the American naval airmen Towers and Read in their flight to the Azores on May 16 was the impossibility of navigating at high speed and yet keeping true to the course when enveloping clouds made the horizon line difficult to determine. The use of an artificial horizon by which it was thought this danger might be overcome has not proved entirely practicable. When the bubble becomes unreliable an aviator must get his bearings not on a circle but on a sphere, since he may be traveling toward any point of the compass, and upward or downward at any angle without being able to know what position his machine is taking relative to the cardinal points or the ground. In fact, he has six cardinal points instead of four, with danger close at hand in at least one direction. Yet he must keep moving at a high speed; so he must know, and know quickly, in which direction to bear. The British in their successful non-stop flight on June 14-15 experienced these difficulties, finding cloud and fog along a great part of their way. Yet occasional glimpses of the water enabled them to calculate their speed and drift and so to steer true to their course. In the first part of the journey icebergs, whose color stood out clearly against the dull drab of the ocean, were found to be of service in making these reckonings.

In regard to winds, the aviator, while far from being absolutely dependent upon them, will always be greatly helped or hindered by their force and direction. As is now well known the movements in the upper air are more constant and usually stronger than the surface winds. Above 500 to 1,000 meters the prevailing westerlies of temperate latitudes can be depended upon. But up to this height the aviator must take into account surface currents, less irregular, of course, over the ocean than over the land, and less variable, because cyclonic centers at sea lose much of their intensity. Over the North Atlantic these surface currents, changing with the passing of extratropical cyclones, tend to flow parallel to the isobars. Consequently an aviator finds favorable wind conditions when the isobars lie parallel to the course he wishes to follow. This happens for the southern route, viz. from Newfoundland to Portugal, when a center of high pressure lies about latitude 30° to 40° N., central in the region of Bermuda, with crest extending eastward, and when a low is situated some 1,000 kilometers east of Newfoundland in about 50° N.

This is the combination apparently sought by the American naval aviators for their venture, and the measure of success attending that initial flight was largely due to the Weather Bureau's forecast of this favorable combination. A center of low pressure, which had moved slowly out of the Gulf of St. Lawrence, had passed northeastward to approximately the position above mentioned, while an area of high pressure had crossed behind this low center, had moved east by south, and apparently was located near Bermuda on May 16, when the seaplanes started. This would result in southeastward winds most of the way to the Azores and eastward winds from there to Portugal. The British flyers Hawker and Grieve, awaiting favorable conditions for their flight northeastward to Ireland on May 18, had to wait until the low center had passed farther northeast and until the winds accompanying it were blowing in that direction over at least a part of the northern course. In their natural ambition to reach Europe first, they seem to have started somewhat too soon and to have run into local storms that were developed on the southernmost extension of this low barometic center. A delay of another 12 hours would probably have given them better weather conditions. In the later successful flight made by the British aviators Alcock and Brown over the northern route on June 14-15, an extensive area of high pressure, which had dominated meteorological conditions off the Newfoundland coast for several preceding days, gave them strong westerly winds over the entire course, enabling them to attain an average speed of over 120 miles an hour.

In conclusion it would seem that two requirements must be met for successful transoceanic travel: first, more accurate forecasting of meteorological conditions in mid-ocean, since all fliers have reported unexpected weather. This can be accomplished only with more complete knowledge of surface and upper-air conditions over the sea, secured perhaps, as Commander Read has suggested, by means of a line of permanently posted ships which will serve as ocean meteorological stations; perhaps by some such system as that being instituted by the British Admiralty, whereby ships passing certain specified points on the high seas at predetermined hours shall report their observations by wireless to central stations, which in turn will issue frequent forecasts covering practically the entire ocean (see the following note). To the greater acquaintance with free-air conditions at sea aviators themselves will no doubt contribute largely. The second requirement is improved means of navigating when the horizon is invisible. The flights recently made demonstrate that until some feasible appliance for this purpose is devised aviators will run the risk not only of delay, or of being driven far out of their course, but also of being lost at sea, through inability to get correct bearings.

Ocean Weather Reports and Forecasts for Aviators. According to *Symons's Meteorological Magazine* for May, 1919 (p. 37), it is announced that the British Admiralty, through the Meteorological Office, is establishing a system by which weather conditions will be reported by wireless three times a day from ships in all parts of the world. In return, wireless bulletins will be issued from 42 widely separated transmission stations, either giving an official statement of existing conditions or forecasting the weather for particular regions. Co-operation on the part of the other nations will be sought, perhaps to the extent of obtaining international ''silent periods'' for the hours 1 A. M., 7 A. M., and 1 P. M. (mean Greenwich time) when signals are being sent, in order thus to facilitate the operation of the system. In the northeastern Atlantic six or seven points are being fixed, and ships in the vicinity of these points at the indicated hours will be asked to furnish reports. This work will become of greatly increased value with the development of the intercontinental air voyages now expected. Aviators, on their part, will also probably contribute reports of upper-air conditions. The successful operation of such a plan should add vastly to our present meager knowledge of ocean meteorology.

GEOGRAPHICAL NEWS

The Centennial Number of the *American Journal of Science*. The July, 1918, issue of the *American Journal of Science* is a Centennial Number, in celebration of the hundredth anniversary of the founding of this publication. The papers of particular interest for geographers are the three under the general title ''A Century of Geology'' and that on ''A Century of Government Geological Surveys.'' This last is by George Otis Smith, Director of the U. S. Geological Survey. The other three are ''Historical Geology,'' by Charles Schuchert; ''Steps of Progress in the Interpretation of Land Forms,'' by Herbert E. Gregory; and ''The Growth of Knowledge of Earth Structure,'' by Joseph Barrell. Each paper traces the development of its respective branch during the last one hundred years, giving particular, but not exclusive, attention to American science. A special volume, reproducing this number of the *Journal*, with important additions, is being prepared for publication by the Yale University Press. This series of papers forms a valuable record of the achievement in the field of geology during what is practically the first century of American science.

Resumption of Publication of *Le Mouvement Géographique*. This weekly periodical, founded in 1884 by the late A. J. Wauters (who died in Brussels on March 25, 1916), has resumed publication after four years of enforced silence, beginning with the issue for January 5, 1919 (Vol. 32, No. 1). It continues its original policy of contributing toward the popularization of geography, giving especial attention to Belgian interests and operations in the Congo. Among other important articles contained in recent numbers are: ''L'état actuel des passes du bas Congo'' (March 9) and ''L'histoire économique du Congo depuis 1914'' (May 4), the latter being an address delivered in the Institut Solvay by J. Geerinckx.

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

United States

South-Central States

Lowe, E. N. **Mississippi: Its geology, geography, soils, and mineral resources.** 335 pp.; maps, ills., index. *Mississippi State Geol. Survey Bull. No. 12.* Jackson, 1915. 9 x 6½.

This is a popular treatise on the geography of the state by the state geologist (who is a native of Mississippi and writes from long experience), mostly a reprint and revision of his *Bulletin 8,* on soils, with about 100 additional pages from other sources. Besides the topics indicated in the title and relating exclusively to Mississippi, there are about 55 pages on the formation of rocks and soils, historical geology in general, soil classification and management, and soil erosion; most of which will doubtless be useful to readers not provided with geological textbooks.

The state is very diversified, in spite of the absence of mountains, and is divided by Lowe into nine or ten "physiographic regions"; but the map of them on page 164 is entitled "soil regions," and it harmonizes perfectly as far as it goes with the colored geological map at the end of the volume and differs from the map of "forest regions" in *Bulletin 7* in only three or four of its boundaries and from that of the "soil and floral regions" on page 138 of *Bulletin 11* in the addition of only one line (separating the "pine meadows" along the coast from the long-leaf pine hills). There is little inconsistency in this, however, for geology, topography, soil, and vegetation are pretty closely correlated in Mississippi, as Hilgard showed long ago; but it would have been just as well to say natural or geographical regions.

Except for a small area of Paleozoic rocks in the northeastern corner, Mississippi is all underlain by Cretaceous and later strata of the Coastal Plain, and the different formations crop out in chronological order in approximately concentric belts, with the oldest at the northeast and the youngest along the coast, except for the broad "Yazoo delta," or Mississippi River flood plain, on the western side of the state.

As in *Bulletin 8* (published about two years earlier), a little more than 100 pages is devoted to the description of the nine regions. The order of treatment for the larger regions is: boundaries, topography, soils, native vegetation, agriculture, and recommendations for improving farm practices. Under the head of soils there are usually mechanical and partial chemical analyses of one or two typical samples (localities not specified), the mechanical analyses taken from government soil surveys and the chemical analyses mostly from Hilgard's reports in the Tenth Census and earlier. The vegetation is described in more detail than one usually finds in geological and geographical publications (doubtless on account of the excellent example set by Dr. Hilgard in his reports on the same state) and with technical names of the plants given in most cases, but the treatment is not very thorough or scientific. There is too little indication of relative abundance; native plants and weeds are not always distinguished; some of the species are wrongly identified; and a rather antiquated nomenclature is used, with some essentially fictitious English names taken from Northern books rather than from local usage.

Under the head of agriculture it would have been very appropriate to mention the proportion of cultivated land in each region and the average expenditure per acre for fertilizers, which in 1909-10 varied (inversely with soil fertility) in different regions from less than a cent in the "delta" to over $2 in the three coast counties. Some regional statistics of density and color of population, rate of increase, value of farm land and buildings, etc., would also have brought out some interesting contrasts and taken up little space.

From a geographical point of view it would have been better to separate the western parts of the north-central plateau and long-leaf pine hills, which are covered with loess or something akin to it, from the loess-free eastern portions, instead of adhering strictly to the boundaries of the Tertiary formations, for the loess makes a considerable difference in soil fertility and therefore in vegetation and civilization. From limited observations in the field the reviewer is inclined to believe that a strip 15 or 20 miles wide at the northern edge of the long-leaf pine hills, north of an unmapped cuesta just south of Ellisville, could be correlated with the lime-sink region of Alabama, Florida, and Georgia. The islands along the coast are not considered in the regional descriptions nor shown at all on the outline map; but if they were a little larger they would deserve to be treated as a distinct region.

Climate is discussed in a chapter by itself, covering less than two pages, which seems inadequate for such a diversified area. In the northwestern portion of the state, where the richest soils are, most of the rain comes in winter and spring; while in the extreme south, where poor sandy soils and long-leaf pine forests prevail, late summer is the rainy season. April, May, October, and November are generally the driest and pleasantest months throughout the state. Nothing is said in the chapter on climate about floods, tornadoes, and hurricanes, whose frequency varies greatly in different regions; but floods and tornadoes are most frequent in the regions of rich soil (and still more so in other states farther up the Mississippi Valley), and hurricanes in the late summer rain belt near the coast.

In the appendixes are 76 very incomplete soil analyses (which do not even mention potash, lime, magnesia, or iron), a table of population of the counties and principal towns in 1900 and 1910, about two pages of agricultural and manufacturing returns for the state as a whole (taken from the latest U. S. Census), an alphabetical list of nearly 400 places whose altitudes are known, a list of fossil localities, and notes on navigable streams. The highest town mentioned is Holly Springs, 602 feet above sea level; but there are many exceeding 400 feet even in the southern half of the state.

In spite of its minor shortcomings, this bulletin will doubtless serve a useful purpose in putting a large store of important facts about their environment within easy reach of citizens of the state who have little acquaintance with scientific literature.

ROLAND M. HARPER

GRONERT, T. G. **Trade in the blue-grass region, 1810-1820.** *Mississippi Valley Hist. Rev.*, Vol. 5, 1918, No. 3, pp. 313-323. Cedar Rapids, Iowa.

WINTER, N. O. **Texas, the marvellous.** xii and 343 pp.; map, ills., bibliogr., index. The Page Co., Boston, 1916. $3.00. 9½ x 6½.

—— [***Topographic map of the United States.***] 1:62 500 Sheets: (1) ***Bullis Gap***, (2) ***Dove Mountain, Tex.*** U. S. Geol. Survey, Washington, D. C., 1918.

MEXICO AND CENTRAL AMERICA

CALVERT, A. S., AND P. P. CALVERT. **A year of Costa Rican natural history.** xix and 577 pp.; maps, ills., bibliogr., index. The Macmillan Co., New York, 1917. $3.00. 9 x 6.

Costa Rica, in relation to her geography and natural history, is one of the most thoroughly investigated sections of Central America. Her situation on both watersheds of the continental divide gives her the rare privilege of presenting within a small area the two main climatic types of the tropics, that is to say perennial rain on the Atlantic slope and well-differentiated seasons—a dry one lasting from December to April and a wet one covering the remainder of the year—on the slope looking toward the Pacific. The topography of the country is unusually irregular, ranging in altitude between sea level and 3,800 meters.

In consequence of such favorable conditions the small territory of Costa Rica offers an epitome of the whole of tropical America, with widely diversified flora and fauna, in which plants and animals of the surrounding countries are largely represented in association with a strong endemic contingent.

It is not strange, therefore, that such a country should have long attracted the attention of naturalists and geographers, the results of whose investigations form an already extended series of scientific contributions. The delightful book in which Mr. and Mrs. Philip P. Calvert now present the results of their special work during one year of residence in Costa Rica is a valuable addition to the list. Besides detailing in many captivating pages their interesting observations of insect and plant life, the work includes a good general description of the central part of the republic and a vivid account of the tremendous earthquake of 1910, which resulted in the complete destruction of Cartago and of which the authors were unwilling witnesses.

From the geographic standpoint the most interesting chapters are those containing the narrative of an excursion to Guanacaste, the northwestern province of Costa Rica, situated between the great continental divide and the Pacific Ocean. These chapters are full of valuable descriptive information about this little-known section. Guanacaste seems to have been the southernmost point reached by the migratory flow descended from the Mexican plateau; it has kept to this day many customs and traditions which ought to be thoroughly investigated and recorded before they disappear entirely. The only subject thus far which seems to have attracted foreign explorers is the extensive graveyards of Nicoya, which are full of the highly prized relics of the Chichimecas but which represent only one side of a vast and as yet unexplored field teeming with folklore and alluring legends. The native customs, the local names of plants, animals, and places all have kept to a degree the imprint of these northern immigrants of far-away times. Furthermore, Guanacaste is noted for the picturesqueness of its landscapes interspersed with clear forests and savanas. Mr. Calvert, who took this trip in company with a traveling school board, repeatedly refers to the presence in almost every village of a formally built and well-kept schoolhouse, a feature which speaks highly of the progress of the country.

An extensive list of the scientific literature bearing on Costa Rica is included in the volume. Considering the variety of subjects touched upon by the authors, the inaccuracies are remarkably few. This work, stamped throughout with the sympathetic personal characteristics of the authors, will henceforward occupy a prominent place by the side of Belt's ''Naturalist in Nicaragua,'' Wallace's ''Tropical Nature,'' Spruce's ''Botanist on the Amazon and Andes,'' and others, in the library of every student of tropical America.

H. Pittier

Flores, Teodoro. **El tequesquite del Lago de Texcoco.** 61 pp.; map, ills. *Anal. Inst. Geol. de México No. 5.* Secretaria de Industria, Comercio y Trabajo, Mexico, 1918. [A peculiar saline material found in lacustrine deposits at several localities on the Mexican plateau.]

Foye, W. G. **Notes on a collection of rocks from Honduras, Central America.** Map. *Journ. of Geol.,* Vol. 26, 1918, No. 6, pp. 524-531.

Gallo, Joaquín. **La unificación de la hora en México.** *Bol. Soc. Mexicana de Geogr. y Estadística,* Vol. 7, 1918, No. 8, pp. 461-465. Mexico.

García y Alva, Federico. **Sonora y sus elementos naturales de riqueza: Su estado actual.** Ills. *Bol. Soc. Mexicana de Geogr. y Estadística,* Vol. 8, 1918, No. 1, pp. 151-203. Mexico.

SOUTH AMERICA

Ecuador, Peru, Bolivia

Reid, W. A. **Bolivia, the heart of a continent: A few facts about the country and its activities.** 54 pp.; map, ills. Prepared for the Bolivian Legation, Washington, D. C., 1916. 9 x 6.

A booklet chiefly of value to the traveler, giving in compact form the elementary facts about the country and its resources. It is accompanied by a map ''showing forest and agricultural areas and mineral localities'' on the scale of 65 miles to the inch. But the ''agricultural areas'' are not really shown. At least if the one color which might indicate them is so interpreted, then the cold *salinas* of the *altiplano* are ''agricultural'', and with them would be classified some of the highest and most barren peaks of the Central Andes. And why a forest at Potosí? Prepared for the Bolivian Legation, it ought to be the most reliable report that could be prepared; the map is an unworthy production.

Lavalle y García, J. A. de. **La contracorriente ecuatorial como causa determinante del fenómeno marino conocido con el nombre de "Aguaje".** *Bol. Soc. Geogr. de Lima,* Vol. 33, 1917, No. 3, pp. 313-330. [In the Bay of Callao and at other places on the Peruvian coast there occurs a phenomenon involving change in the color of the sea water and emanations of sulphureted hydrogen. The phenomenon is known to take place during the months December to April, the period during which the equatorial countercurrent is experienced. The normally cool waters off the coast of Peru abound in plankton. The organisms are susceptible to sudden and great changes in temperature such as take place when the countercurrent is developed. Under such circumstances the plankton is killed in great quantities, producing a turbidity of the water. Accumulated in the shallow bays, the plankton decomposes and gives rise to the gaseous emanations. Such is the explanation advanced here; actual proof must depend, as the author says, upon the collection of hydrographic data.]

Means, P. A. **Social conditions in the Piura-Tumbes region of northern Peru.** Ills. *Scientific Monthly,* Vol. 7, 1918, No. 5, pp. 385-399.

Miller, L. E. **A glimpse into the Quichua country of southern Bolivia.** Ills. *Amer. Museum Journ.,* Vol. 17, 1917, No. 6, pp. 407-415.

NORDENSKIÖLD, ERLAND. **Die Bevölkerungsbewegung unter den Indianern in Bolivien.** *Petermanns Mitt.*, Vol. 63, 1917, April, pp. 108-112. [Abstracted in the *Review*, Vol. 4, 1917, p. 487.]

NORDENSKIÖLD, ERLAND. **Die östliche Ausbreitung der Tiahuanacokultur in Bolivien und ihr Verhältnis zur Aruakkultur in Mojos.** Ills. *Zeitschr. für Ethnologie*, Vol. 49, 1917, No. 1, pp. 10-20. Berlin.

—— **Peru: General descriptive data.** 31 pp.; ills. Pan American Union, Washington, D. C., 1916.

PORTOCARRERO, J. N. **Informe sobre el Valle de Chincha.** 56 pp.; maps, diagr. *Bol. Cuerpo de Ingenieros de Minas del Perú No. 92.* Lima, 1918. [A study of the water supply and means of its distribution in one of the numerous oasis valleys of the coastal desert of Peru.]

REID, W. A. **Bolivia's railways—progress and prospects.** Maps, ills. *Bull. Pan Amer. Union,* Vol. 45, 1917, No. 4, pp. 478-496.

SAVILLE, M. H. **Some unpublished letters of Pedro de la Gasca relating to the conquest of Peru.** Ills., bibliogr. *Proc. Amer. Antiquarian Soc.*, Vol. 27, 1917, Part 2, pp. 336-357. Worcester, Mass.

SINGEWALD, J. T., JR., AND B. L. MILLER. **The mining industry of Peru.** Map, ills. *Engineering and Mining Journ.*, Vol. 101, 1916, No. 20, pp. 845-850. New York.

SUTTON, C. W. **Irrigation and public policy in Peru.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 3, Section 3: Conservation of Natural Resources, pp. 840-854 (discussion, pp. 850-854). Washington, D. C., 1917.

SUTTON, C. W., AND J. N. PORTOCARRERO Y C. **Informe preliminar sobre un proyecto para irrigar las Pampas de Chimbote.** 18 pp.; map. *Bol. Cuerpo de Ingenieros de Minas del Perú No. 91.* Lima, 1918. [In the Peruvian desert along the Pacific coast there is an excellent climate, the soil is productive, when watered, and communication by ocean routes is easy. Ruins of ancient canals show that irrigation was more extensive in pre-Columbian days than at present. The Peruvian government by means of such surveys as this is attempting to augment the area under cultivation. Sugar and cotton are the principal products.]

UMLAUFF, A. F. **La región sísmica de Caraveli.** Map, diagrs. *Bol. Soc. Geogr. de Lima,* Vol. 31, 1915, No. 3, pp. 223-257.

WALLE, P. **L'industrie du pétrole au Pérou.** *Bull. Soc. de Géogr. Commerc. de Paris,* Vol. 40, 1918, No. 4-5-6, pp. 91-99.

EUROPE

BRITISH ISLES

DAVISON, CHARLES. **The Ochil earthquakes of the years 1900-1914.** Diagrs. *Proc. Royal Soc. of Edinburgh,* Vol. 36, 1915-16, Part 3-4, pp. 256-287. [The Ochils are hills of volcanic rock which rise out of the Scottish lowland near its northern rift border.]

DEWEY, HENRY. **On the origin of some river-gorges in Cornwall and Devon.** Maps, diagrs., ills. *Quart. Journ. Geol. Soc.*, No. 285, Vol. 72, 1917, Part 1, pp. 63-76 (discussion, pp. 74-76). London.

FARROW, E. P. **On the ecology of the vegetation of Breckland: II, Factors relating to the relative distributions of Calluna-heath and grass-heath in Breckland; III, General effects of rabbits on the vegetation; IV, Experiments mainly relating to the available water supply; V, Observations relating to competition between plants; VI, Characteristic bare areas and sand hummocks.** Diagrs., ills. *Journ. of Ecol.*, Vol. 4, 1916, No. 2, pp. 57-64; Vol. 5, 1917, No. 1, pp. 1-18; No. 2, pp. 104-113; No. 3-4, pp. 155-172; Vol. 6, 1918, No. 2, pp. 144-152. London. [Part I was listed in the *Review*, Vol. 1, 1916, p. 388. Breckland is a heath district in East Anglia which "presents the nearest approach to continental steppe conditions to be found in Great Britain."]

FAWCETT, C. B. **Edale: A study of a Pennine dale.** Map, diagrs., ill. *Scottish Geogr. Mag.*, Vol. 33, 1917, No. 1, pp. 12-25.

FAWCETT, C. B. **Natural divisions of England.** Map. *Geogr. Journ.*, Vol. 49, 1917, No. 2, pp. 124-141 (discussion, pp. 135-141). [Abstracted, with map, in the February, 1919, *Review*, pp. 114-115.]

Fawcett, C. B. **The Middle Tees and its tributaries: A study in river development.** Maps, diagrs. *Geogr. Journ.*, Vol. 48, 1916, No. 4, pp. 310-323.

Hosgood, Blanche. **Southern Forfarshire: A regional study.** Map, diagrs., bibliogr. *Scottish Geogr. Mag.*, Vol. 35, 1919, No. 1, pp. 15-29; No. 2, pp. 55-71.

Inglis, H. R. G. **Early maps of Scotland and their authors (Maps in the Library of the Royal Scottish Geographical Society).** Maps. *Scottish Geogr. Mag.*, Vol. 34, 1918, No. 6, pp. 217-230; No. 10, pp. 378-386; Vol. 35, 1919, No. 2, pp. 41-46. [The third instalment is accompanied by notes, by M. C. Andrews, on the earliest-known printed map of Scotland. See note in the April, 1919, *Review*, p. 266.]

Jeffreys, Harold. **On the vegetation of four Durham coal-measure fells, III: On water-supply as an ecological factor.** Diagrs., ills. *Journ. of Ecol.*, Vol. 5, 1917, No. 3-4, pp. 129-154. London. [Parts I and II, although not so marked, make up the instalment listed under "Jeffreys" in the *Review*, Vol. 5, 1918, p. 251.]

Marr, J. E. **The geology of the Lake District and the scenery as influenced by geological structure.** xii and 220 pp.; maps, diagrs., ills., index. University Press, Cambridge, 1916. 12s. 9 x 6. [The student of geography will be interested in the discussion of the influence of geological structure and geological events upon the physical features of the region. Here are condensed descriptions of the great variety of topographic forms, originally due to ice action, which contribute to the beauty of a famous English "playground."]

Mort, Frederick. **The rivers of south-west Scotland.** Maps. *Scottish Geogr. Mag.*, Vol. 34, 1918, No. 10, pp. 361-368.

Newlands, Alexander. **Water power in Great Britain (with special reference to Scotland): Its amount and economic value.** Map. *Journ. Royal Soc. of Arts*, No. 3401, Vol. 66 1918, Jan. 25, pp. 168-188 (discussion, pp. 186-188). London. [With a map and statistical estimates.]

Newnham, E. V. **The persistence of wet and dry weather.** Diagrs. *Quart. Journ. Royal Meteorol. Soc.*, No. 179, Vol. 42, 1916, pp. 153-161 (discussion, pp. 161-162). London. ["In this paper an attempt is made to analyze the rainfall records of several British stations with the help of modern statistical methods, in order to find out to what extent the tendency for wet and fine days or hours to occur in 'runs' can assist in forecasting rain in the near future."]

Pearsall, W. H. **The aquatic and marsh vegetation of Esthwaite Water.** Maps, diagrs., bibliogr. *Journ. of Ecol.*, Vol. 5, 1917, No. 3-4, pp. 180-202; Vol. 6, 1918, No. 1, pp. 53-74. London.

Richardson, Ralph. **The new Parliamentary division of Scotland, under the Representation of the People Act, 1918.** *Scottish Geogr. Mag.*, Vol. 34, 1918, No. 8, pp. 294-298.

Shaw, Napier. **Illusions of the upper air.** Map, diagrs., ills. *Proc. Royal Inst. of Great Britain*, No. 110, Vol. 21, Part III, 1918, pp. 603-624. [A discourse delivered March 10, 1916, reviewing the progress of meteorological theory in England since 1866. A report of it was published in *Nature*, Vol. 97, 1916, pp. 191-194 and 210-213. An extract also in *Scientific American Suppl.*, No. 2147, Vol. 83, 1917, Feb. 24, pp. 124-126.]

Smith, William G. **The distribution of *Nardus stricta* in relation to peat.** Map, ills., bibliogr. *Journ. of Ecol.*, Vol. 6, 1918, No. 1, pp. 1-13. London. [Refers to North Britain.]

Stirling-Maxwell, J. M. **Afforestation.** Ills. *Scottish Geogr. Mag.*, Vol. 33, 1917, No. 3, pp. 97-108. [In Britain.]

Strahan, Aubrey. **The search for new coal-fields in England.** Maps, diagrs. *Proc. Royal Inst. of Great Britain*, No. 110, Vol. 21, Part III, 1918, pp. 625-638.

Whitley, D. G. **The early tin trade of Cornwall according to Strabo's geography.** *Trans. Royal Geol. Soc. of Cornwall*, Vol. 13, 1914, Part X, pp. 595-610. Penzance. [An attempt to prove, from Strabo's description, that the Cassiterides of the Phenicians were the Scilly Islands. In Vol. 13, 1912, Part VIII, pp. 515-529, of the same publication the author discussed the statements of Herodotus and Himilco, the Carthaginian, relating to the same subject.]

—— **Wool, The command of (British).** *Journ. Royal Soc. of Arts*, No. 3375, Vol. 65, 1917, pp. 617-619. London.

YAPP, R. H., D. JOHNS, AND O. T. JONES. **The salt marshes of the Dovey Estuary.** Maps, diagrs., ills., bibliogr. *Journ. of Ecol.*, Vol. 4, 1916, No. 1, pp. 27-42; Vol. 5, 1917, No. 2, pp. 65-103. London.

BACON, G W. ***Bacon's commercial map of Great Britain showing all railways and stations, canals, navigable rivers, main roads & steamship routes.*** 1:554,400, or 8¾ miles to 1 inch. Insets: Birmingham, Bristol & Bath, Cardiff & Merthyr, Leeds & Bradford, Newcastle, Sheffield, each about 1 inch to 4 miles; Liverpool, Manchester, each about 1 inch to 3 miles; London, 1 inch to 2 miles. G. W. Bacon & Co., London, [1916]. [Valuable for its differentiation of railroad systems by colored symbols.]

GERMANY[1]

BALCH, T. W. **The question of Alsace and Lorraine.** 89 pp.; map, ills., bibliogr., index. Allen, Lane, & Scott, Philadelphia, 1918. 10 x 7.

The name of Alsace-Lorraine stands for more than a mere boundary rectification. It is symbolic of a principle which men of eastern and western nations have rushed to defend. Hence these pages, many of which are products of the author's personal observations, derive peculiar significance. But the importance of their subject matter is not their sole attraction. They are flooded with human sympathy and historical interest. The blend of these qualities makes the book a valuable one.

In a simple style Mr. Balch gives a picture of Alsace-Lorraine as he saw the provinces on the occasion of trips made within the past twenty years. His observations shed light on the failure of race or language to produce that feeling of kinship which we call nationality when ideals of civilization are at stake. He shows us that the natives had greater sympathy with France than with Germany simply because they were convinced, even though many of them spoke a Teutonic language or were Teutons, of the superiority of French standards.

As a problem of environmental influences the subject is of deep interest, perhaps because it can be examined with greater profit everywhere along debatable border zones. In this light Alsace-Lorraine represents a phase in the spread of democratic ideals in Europe. The geographer is reminded of the fact by the perusal of local descriptions such as are to be found in this book. Therein lies the value of the outsider's contribution to geography, and Mr. Balch well deserves credit for his share.

LEON DOMINIAN

ANFOSSI, GIOVANNI. **L'isola di Helgoland e l'erosione marina.** Map, diagrs., ills. *Boll. Reale Soc. Geogr.*, Vol. 5, 1916, No. 2, pp. 101-121. Rome.

BELLOC, HILAIRE. **The bridge-heads of the Rhine.** Maps. *Land and Water*, No. 2953, Vol. 72, 1918, December 12, pp. 3-6. London. [A discussion of the strategic value of these river crossings.]

BRECKWOLDT, JOHN. **Die hydrographischen Veränderungen in Schleswig-Holstein.** Map, bibliogr. *Schriften des Naturwiss. Vereins für Schleswig-Holstein*, Vol. 16, 1914, No. 1, pp. 44-164. Kiel.

CRONHEIM, PAUL. **De nieuwste kartelvorming in Duitschland.** *Tijdschr. voor Econ. Geogr.*, Vol. 7, 1916, No. 5, pp. 222-223. The Hague.

EICHLER, J., R. GRADMANN, AND W. MEIGEN. **Ergebnisse der pflanzengeographischen Durchforschung von Württemberg, Baden und Hohenzollern.** Maps. *Beilage zu Jahreshefte des Vereins für Vaterländische Naturkunde in Württemberg und Mitt. des Badischen Landesvereins für Naturkunde und Naturschutz*, Vol. 70, 1914, No. 6, pp. 317-388. Stuttgart.

FELS, EDWIN. **Der heutige Stand der Kenntnisse über die bayerischen Seen.** Bibliogr. *Mitt. der Geogr. Gesell. in München*, Vol. 9, 1914, No. 3, pp. 375-400.

FLEURE, H. J. **Berlin and its region.** 15 pp.; maps. Contributed as a basis for discussion to the Sociological Society (Cities Committee), [Oct., 1915]. Sherratt & Hughes, London, 1916. [Abstracted, with map, in the *Review*, Vol. 3, 1917, pp. 399-401.]

HELLMANN, G. **Häufigkeit und Dauer der Niederschläge.** *Meteorol. Zeitschr.*, Vol. 33, 1916, No. 9, pp. 391-398. Brunswick. [Relates to Germany.]

JAHN, MARTIN. **Die Bewaffnung der Germanen in der älteren Eisenzeit etwa von 700 v. Chr. bis 200 n. Chr.** x and 276 pp.; maps, diagrs., ills., bibliogr., index. (Mannus-Bibliothek, No. 16.) Curt Kabitzsch Verlag, Würzburg, 1916. M. 7. 10 x 7½.

---

[1] The territorial changes of the peace treaty will be taken into account in the next volume of the *Review*.—EDIT. NOTE.

Kunisch, Erwin. **Der Gardersee und Gr. Dolgensee. Mit einem Anhang: Ein Beitrag zur Kenntnis des Lebasees.** Maps, diagrs., ills., bibliogr. *Jahresbericht der Geogr. Gesell. zu Greifswald,* Vol. 13, 1911-12, pp. 149-233. [Two coastal lakes of Pomerania.]

Lachmann, G. **Die Höhe der Schneedecke in Norddeutschland.** Maps. *Meteorol. Zeitschr.,* Vol. 33, 1916, No. 7, pp. 289-305. Brunswick.

Levin, Emil. **Zur Klimatologie und Hydrologie des Peenegebietes (Abflussvorgang der Peene).** Map, diagrs., bibliogr. *Jahrbuch für die Gewässerkunde Norddeutschlands, Besondere Mitt.,* Vol. 2, 1914, No. 8, pp. 1-51. Preussische Landesanstalt für Gewässerkunde, Berlin. [The Peene, draining a number of small lakes in the Baltic moraine, flows eastwards into the Swinemünde lagoon.]

—— **Mitteilungen aus der Forst- und Kameralverwaltung für das Wirtschaftsjahr 1909.** Diagrs. *Beiträge zur Statistik des Grossherzogtums Hessen,* Vol. 61, 1911, No. 4, pp. 1-46; **Wirtschaftsjahr 1910,** Vol. 62, 1912, No. 2, pp. 1-43; **Wirtschaftsjahr 1911,** Vol. 62, 1913, No. 6, pp. 1-44; **Wirtschaftsjahr 1912,** Vol. 64, 1914, No. 1, pp. 1-48. Grossh. Hessische Zentralstelle für die Landesstatistik, Darmstadt.

Müns, R. **Über Ionisation und Radioaktivität der Atmosphäre in Kiel.** Diagrs., ill. *Schriften des Naturwiss. Vereins für Schleswig-Holstein,* Vol. 16, 1914, No. 1, pp. 1-43. Kiel.

Mylius, H. **Berge von scheinbar ortsfremder Herkunft in den bayerischen Alpen.** *Mitt. der Geogr. Gesell. in München,* Vol. 9, 1914, No. 3, pp. 435-478.

Praesent, Hans. **Die landeskundliche Literatur von Vorpommern und Rügen, 1906-1912.** *Jahresbericht der Geogr. Gesell. zu Greifswald,* Vol. 13, 1911-12, pp. 107-148.

Schenk, Rudolf. **Zur Oberflächengestaltung und Siedelungskunde des hessischen Riedes.** Maps, bibliogr. *Jahresbericht des Frankfurter Vereins für Geogr. und Statistik,* Vol. 77 and 78, 1912-13 and 1913-14, pp. 5-120. Frankfort on the Main, 1914. [''By the term 'Hessian Ried' is here meant the northern part of the Middle-Rhine graben valley which belongs politically to Hesse.'']

Vidal de la Blache, Paul. **Exode et immigration en Alsace-Lorraine.** *Rev. des Sci. Polit.,* Vol. 35, 1916, June 15, pp. 308-318. Paris.

—— **Volkszählung, Die, im Deutschen Reiche am 1. Dezember 1910.** Part I: **Einleitung und Darstellung der hauptsächlichen Ergebnisse.** vii and 155 pp.; diagr. (Statistik des Deutschen Reichs, Vol. 240.) Berlin, 1915.

Scandinavia

—— **Befolkningens fördelning efter yrke och näring i Helsingfors, Åbo, Viborg, Tammerfors, Nikolaistad, Björneborg, och Uleåborg, den 7 december 1910.** 48 and 68 pp. *Befolkningsstatistik,* No. 48, Vol. 6, 1916. Finlands Officiella Statistik, Helsingfors. [Population distribution according to occupation and trade.]

Engström, E. O. **Flodvågen i Dalälfven våren 1916.** 9 pp.; diagrs. Abstract from *Teknisk Tidskr., Väg- och Vattenbyggnadskonst,* 1916, No. 11. Hydrografisk Byrå, Stockholm, 1916. [Floods in the Dal Älf lake system, which discharges into the Gulf of Bothnia southeast of Gäfle in 60° 40′ N.]

—— **Finlands folkmängd den 31 december 1910 (enligt församlingarnas kyrkoböcker). Vol. 2: Den närvarande befolkningens fördelning efter yrke och näring.** 88 and 99 pp. *Befolkningsstatistik,* No. 47, Vol. 6, 1916. Finlands Officiella Statistik, Helsingfors. [Population of Finland according to parish registers: present distribution of the population according to occupation and trade.]

Frahne, Carl. **Das Wirtschaftsleben Schwedens. Ein Ueberblick auf statistischer Grundlage unter besonderer Berücksichtigung der deutsch-schwedischen Wirtschaftsbeziehungen.** 167 pp.; map, diagrs., bibliogr. Emil Ebering, Berlin, 1914.

Gerain, Louis. **"L'évaluation de la mer" dans les eaux danoises.** Map. *La Géographie,* Vol. 31, 1916-17, No. 4, pp. 261-269. Paris. [Valuation from a biological point of view.]

Grönwall, K. A. **De skånska stenkolsfälten och deras tillgodogörande.** Maps, diagrs., ills. Reprint from *Populär Naturvetenskaplig Revy,* 1915, No. 3-6, pp. 115-193. Sveriges Geologiska Undersökning, Stockholm. [The anthracite coalfields of Scania, Sweden, and their utilization.]

Hildebrandsson, H. H. **Om de stundom om vintern förekommande våldsamma oststormarna från de norska fjällen.** Maps, diagr. *Ymer*, 1917, No. 1, pp. 36-49. [Winter storms.]

La Cour, D. **Abnorme Vandstandsforhold i de danske Farvande. 1: Vandstandsforholdene den 15'-16' Januar 1916.** 83 pp.; maps, diagrs. *Dansk Meteorol. Inst. Meddelelser No. 4.* Copenhagen, 1917. [Abnormal water levels in the Danish fairways.]

—— **1914 års torka och dess inverkan på sjöarnas avlopp.** (La sécheresse de l'année 1914 et son influence sur l'écoulement des lacs.) *Hydrogr. Byrån Årsbok*, 1914, No. 6, pp. 25-72. Map, diagrs. Stockholm, 1917.

Nordén, Arthur. **Hällristningarnas kronologi och betydelse.** Ills. *Ymer*, 1917, No. 1, pp. 57-83. [Date and meaning of pictured rocks in Scandinavia.]

Rabot, Charles. **L'hiver 1917 dans la Scandinavie.** *La Nature*, No. 2273, 1917, Apr. 21, pp. 248-249. [Abstracted in the *Review*, Vol. 4, 1917, pp. 319-320.]

Rabot, Charles. **L'hiver de 1917 en Norvège et en Suède.** *La Géographie*, Vol. 31, 1916-17, No. 5, pp. 343-349. Paris.

Störmer, Carl. **Summary of results of the aurora-borealis expedition of 1913 to Bossekop, Norway.** Maps, diagrs. *Terrestr. Magnet. and Atmospher. Electr.*, Vol. 21, 1916, No. 4, pp. 157-168. Washington, D. C.

Wallén, Axel. **Nederbördens och temperaturens inflytande på Dalälfvens vårhögvatten och vinterlågvatten.** Diagrs. Reprint from *Hyllningsskr. tillägnad J. G. Richert*, pp. 130-160. Hydrografisk Byrå, Stockholm, 1917. [Influence of rain and temperature on spring high water and winter low water of the Dal Älf lake system. See entry under "Engström," above.]

Wallén, Axel. **Sveriges vattensystem.** 14 pp.; map, diagr., ills. Hydrografisk Byrå, Stockholm, 1916. (Abstract from "Sveriges Land och Folk," edited by J. Guinchard; see *Geogr. Rev.*, Vol. 1, 1916, p. 317.) [Hydrographic system of Sweden.]

Wallén, Axel. **Vattenståndsförutsägelserna: Granskning af 1915 års resultat och prognoser för år 1916.** 21 pp.; map, diagrs. Abstract from *Teknisk Tidskr., Väg- och Vattenbyggnadskonst*, 1916, No. 3. Hydrografisk Byrå, Stockholm, 1916. [Water level prediction.]

AFRICA

General

Río Joan, Francisco del. **África Occidental Española (Sáhara y Guinea).** 391 pp.; maps, diagrs., ills., index. Ministerio de Estado, Sección Colonial, Madrid, 1915. 6½ x 9.

The author is an engineer of distinction in the Spanish service. He was sent to the Spanish African possessions in 1914 to report upon their conditions. His book is packed with information, criticism, and suggestion.

He found Fernando Po still unoccupied for any purpose. The island comprises about 550,000 acres, and only one acre in twenty-two is under cultivation. Cacao is the principal crop, but it is harvested from only a small part of the lands adapted for its cultivation.

The author sees no prospect that Rio de Oro, Spain's possession in the Sahara, will ever be important. There is some trading with the desert natives, who bring ostrich feathers to exchange for a few European commodities, and the coastal fishery has considerable value. He speaks of Rio Muni, Spain's continental territory to the southwest of Fernando Po, as being scarcely known except along its boundaries. The fact is that the results of the primary surveys have not yet been published. The Spanish occupation has extended only along the coast and the lower courses of a few rivers. It will be remembered that when the Allies finally conquered Kamerun the Germans retreated into this Spanish territory, where they were not molested. A cartographic and statistical supplement accompanies the book. Cyrus C. Adams

Buxton, Noel. **The international factor in the African settlement.** *Contemporary Rev.*, No. 635, Vol. 114, 1918, November, pp. 513-520. London.

Sharpe, Alfred. **The backbone of Africa.** Ills. *Geogr. Journ.*, Vol. 52, 1918, No. 3, pp. 141-157 (discussion, pp. 154-157). ["Survey of an imaginary journey . . . from the southern Indian Ocean to the Mediterranean."]

THIERRY, RENÉ. **L'Afrique de demain et le pangermanisme colonial.** *L'Afrique Française,* Vol. 28, 1918, No. 9-10, pp. 279-288. Paris.

CONGO BASIN AND LOWER GUINEA

SPRINGER, J. M. **Pioneering in the Congo.** xx and 312 pp.; map, ills. Methodist Book Concern, [New York], 1916. $1.00. 7½ x 5.

This book, by a missionary, is valuable from a geographical point of view because it contains much information as to the present economic development and the prospects of the large region between Lunda in the west and the great copper-mining region of Katanga in the east, roughly between 7° and 12° S. and 20° and 28° E. Mr. Springer observed a great change in the attitude of the Belgian government towards the natives, whose rights are now respected and whose welfare is promoted in striking contrast with the régime of the late King Leopold. Years ago that astute financier, Robert Williams, sent his prospectors 1,000 miles north of the railhead of the Cape-to-Cairo railroad to find the copper field that Livingstone had reported a generation before, now known as one of the greatest in the world. The two newspapers at Elizabethville, in this mining field, printed daily despatches on the European war, which were also sent forward by wireless to more remote regions. The whites in a large area of central Africa, south of the equator, are getting their morning news of European happenings earlier than we because they live so far east of us. The author has good grounds for his conviction that this large central area will have great development and that the natives will have their share in the work, not only as miners but also as farmers, craftsmen, and teachers.

CYRUS C. ADAMS

ASIA

RUSSIAN CENTRAL ASIA

FELL, E. N. **Russian and nomad: Tales of the Kirghiz Steppes.** xxvii and 201 pp.; ills. Duffield & Co., New York, 1916. $2.00. 8½ x 6.

It is a pity that Mr. Fell is not a geographer instead of a mining engineer. If he were a geographer he would have written a book which would take its place as a classic. Even without technical training in geography, and without any claim to writing a scientific treatise, he goes to the heart of the matter and gives one a deep glimpse into the very lives of the people.

Perhaps the best test of the value of a book is the number of times that one thinks of it after it is finished. The reviewer read Mr. Fell's book before the Russian situation had developed into Bolshevism. Since then he has thought of it again and again. Take these two quotations:

"Now there are two ways of carrying on the practical business of society; one is to assume that each individual is, in the nature of things, better suited than anybody else to take care of himself; and the other is to assume that there is, in the state somewhere far away in the distance, some personage, be he emperor or king or president, who is better able to take care of the individual than the individual himself. In Russia it was long ago decided by Ivan the Terrible or by Peter the Great or by some other personage of forceful character that the individual knows nothing at all of the way in which his business should be conducted."

"To the writer it seems that the Russian form of paternalism derives its force from below and not from above. It comes less from the desire of those in high authority to control the action of the masses than from the desire of the latter to impose on other shoulders than their own the responsibility of their actions. On the spiritual side, they rest their faith in God; on the practical side, they rely for guidance on some one in higher authority than themselves. The logical conclusion is: the authority of God in all things spiritual, and the authority of the 'Gosudar' (Czar) in all things temporal."

In these days when the fate of Russia is in the balance it is well to read books like this. In the fervor of the moment we think that Russia has changed. Perhaps that is true, but if Russia has changed, the *Russians* have not changed. Nor will they change for many generations.

Mr. Fell's book is by no means a philosophical treatise. On the contrary it is a delightful work of travel. The author lived in southern Siberia, not far from Lake Balkash, and was in charge of some large copper mines for a period of seven years or so. His book is a pleasant, chatty recital of his adventures among Russians and Kirghiz. He tells of sledge journeys with the thermometer thirty or forty degrees below zero; he vividly describes the beauty of the one month that can be called spring; and he speaks of a little pink flower which grows only in soil impregnated with copper and thus forms a sort of prospector's guide.

All through the book the Siberian winter keeps coming in as an undertone. "All winters are tedious when they are seven months long. The first dash of the frost giants over the hills in the autumn is inspiriting, and the first jangle of sleigh bells over the fresh snow makes the blood tingle, but before the first of May has come the fierce winds have swept bare the level places, and where the snow lies it is driven into ice drifts and glazed by the emery blasts of the ceaseless storms. The landscape looks tired and it is tired, and so are you. Your fur coat and felt overshoes are hateful burdens; the storm doors and windows oppress your house with an airless gasp; each year it seems as though spring were delayed and would never come."

Such conditions prevail in most parts of Russia. How much have they to do with the inertia which permits autocracy at one time and Bolshevism at another?

There is a brighter side to Mr. Bell's little book. It is the descriptions of the friendly, pleasant ways of both the Russians and the Kirghiz who work in the mines. To be sure, agitators who would now be Bolsheviki led them to strike and to be very unruly for a while, but that only makes a good story. On the whole, however, they are a most friendly folk, and one feels well acquainted with them when the book is laid down. The volume might well be longer. For example, it includes an account of a trip to Lake Balkash by Mrs. Vans Agnew, the daughter of Mr. Fell. That lake is so unfamiliar that her description is just enough to make one long for a fuller account of all the interesting life of the desert around its turquoise waters.

Ellsworth Huntington

AUSTRALASIA AND OCEANIA

Australia, New Zealand

Andersson, Gunnar. **Australien, natur och kultur: Studier och minnen.** vii and 264 pp.; maps, diagrs., ills., index. Hugo Gerbers Förlag, Stockholm, [1916]. 7 kroner. 10 x 7.

Mr. Andersson deals with the possibilities of the fifth continent as a white man's land and its contribution to the world's sum of useful produce. The keynote of the book lies in the words: "The heroic deeds that form milestones in the history of Australia are not those of the battlefield. The heroes of Australia have waged their fight against thirst, against unending distances, against the wild silent forests where the eucalyptus formerly reigned undisputed lord of all. Their progress is marked by cleared ground, by millions and millions of sheep and cattle, by pleasant homes and rising cities."

The history of economic development in Australia is especially vital now in view of the inexhaustible supplies of food which that continent can pour into the depleted storehouses of the Old World. The author reminds us that Australia is only one and a quarter centuries old as a white man's land, and that it has a population of less than 5,000,000 in an area almost exactly equal to that of the United States. Yet the natural conditions are such as to demand the co-operative action usually found only in more closely settled communities.

Formerly the vast herds of sheep and cattle were utilized only for hides, wool, and tallow. In the sixties the canning industry was started; but the amount of meat that could be packed was wholly inadequate, and millions of carcasses still rotted in the bush while the poor people of Europe were famished. Finally, in the eighties, a process of freezing meat so that it could be transported across the ocean was perfected. Now great quantities of beef, mutton, and rabbit meat are frozen and exported, principally to England. (An illuminating picture is that of a farmer driving to the nearest freezing-plant with twelve hundred rabbits nailed to his wagon.) Australians have raised a monument to Thomas Sutcliffe Mort, who started the first experiment in freezing meat. Sheep in Australia in 1913 numbered over 83,000,000, the cattle about 10,500,000. The herds can be greatly increased, as the interior is made inhabitable. About 1,300 wells have been bored in the Great Artesian Basin in the northern and central part of the continent, and in this way it is possible to use for grazing vast stretches of land where the grass is nourishing but where lack of drinking water formerly kept out both men and animals.

Drought is the great enemy of the Australian farmer. In the eighties, an American firm, Chaffey Brothers, started the first artificial irrigation plants at two points on the Murray River, and this was the beginning of a rapid development. The great expense of the irrigation systems necessitates intensive farming, and the country in some sections is now divided into small farms and fruit ranches. The import and export of fruit are now about equal, but the export is rapidly gaining. The wheat area is being extended year by year from the western coast into the interior. The cultivation of concentrated fodder, principally alfalfa, makes it possible to keep two million cows where they can be milked instead of roaming wild in the bush, and this is the beginning of an Australian dairy industry. Indeed there seems no limit to the possibilities of the southern continent as a food-producer.

Mr. Andersson has some interesting chapters on the early history of the country, its political development, the discovery and exploitation of the gold fields, and the recent social legislation. The volume is excellently bound and has over eighty valuable charts, maps, and pictures of more than ordinary attractiveness. HANNA ASTRUP LARSEN

HUNT, H. A., edit. **Results of rainfall observations made in South Australia and the Northern Territory, including all available annual rainfall totals from 829 stations for all years of record up to 1917.** 421 pp.; maps, diagrs. Bur. of Meteorol., Commonwealth of Australia, Melbourne, 1918. 10s. 6d. 12 x 9½.

The activity of the Australian Commonwealth Bureau of Meteorology is remarkable. A steady stream of important publications continues to flow to the reviewer's desk. Even the war brought no interruption, only delay. The present volume is one of a series, of which three numbers (New South Wales, Victoria, and Queensland) have already been issued, leaving two more still to come (Western Australia and Tasmania). In the issue before us we have tabulations of all the available annual totals of rainfall and of wet days for 829 stations—surely a very large number considering the area concerned—up to the year 1917. For about 200 stations there are also monthly totals to 1915. Such complete information for these sections of Australia has not before been embodied under one cover. Owing to delays due to the war the annual totals for 1916 and 1917 appear in supplementary form. In order to have the work complete for reference and for comparison, authentic annual (for the individual years 1878-1917) and also average annual and monthly rainfall and monthly rainfall maps are included. There are notes on the annual variation and monthly distribution of the rainfall, and a record of notable meteorological events. The incidence of the summer and winter rainfalls and the resultant wheat yields in South Australia are given special attention, the date being presented in both tabular and map form. The monthly and annual meteorological elements and normals for Adelaide and Darwin are given in appendixes.

This mere enumeration of the contents of the volume will serve to show how very complete and extensive is the information it contains. There is a remarkable abundance of excellent maps and of diagrams. While the details are of immediate concern only to those who are making special studies of Australian weather and climate, the volume is one which surely deserves mention in the *Review*. Those who, for one reason or another, have occasion to look up the rainfall conditions of the Australian Commonwealth will realize their lasting indebtedness to Mr. Henry A. Hunt and to his excellent staff of assistants and observers. R. DEC. WARD

BELTRÁN Y RÓZPIDE, RICARDO. **Juan Fernández y el descubrimiento de la Australia.** *Rev. de Geogr. Colon. y Mercantil*, Vol., 15, 1918, No. 8-10, pp. 347-362. Real Soc. Geogr., Madrid.

KOMOROWICZ, MAURICE VON. **Vulkanoseismische Studien im Norden Australasiens.** Diagrs., bibliogr. *Zeitschr. für Vulkanologie*, Vol. 2, 1916, No. 3, pp. 99-128. Berlin.

LEWIS, JOHN. **Our early pastoral possessions and the pioneers of settlement in South Australia.** Maps, ills. *Proc. Royal Geogr. Soc. of Australasia: South Australian Branch*, Vol. 17, 1915-16, pp. 8-92. Adelaide. [Presidential address.]

LEWIS, JOHN. **Some notes on the early navigation of the River Murray.** Map, ills. *Proc. Royal Geogr. Soc. of Australasia: South Australian Branch*, Vol. 18, 1916-17, pp. 2-104. Adelaide. [Presidential address.]

MORTENSEN, T. **Et besøg paa Auckland- og Campbell-Øerne.** Maps, ills. *Geografisk Tidskrift*, Vol. 23, 1916, No. 8, pp. 271-283. Copenhagen.

PARK, JAMES. **Pleistocene glaciation of New Zealand.** Ills. *Geol. Mag.*, Decade 6, Vol. 5, 1918, No. 9, pp. 394-397. London.

PICCOLI, L. L. **Lo sviluppo economico dell'Australia Occidentale.** *L'Esplorazione Commerc.*, Vol. 31, 1916, No. 11-12, pp. 425-435. Milan.

SCHLICH, WILLIAM. **Forestry in the Dominion of New Zealand.** *New Zealand Journ. of Sci. and Technol.*, Vol. 1, 1918, No. 4, pp. 201-210. Wellington.

SHUFELDT, R. W. **Captain White's recent exploratory work in Australia.** *Science*, No. 1144, Vol. 44, 1916, Dec. 1, pp. 793-795.

SLOANE, T. G. **On the faunal subregions of Australia.** Map. *Proc. Royal Soc. of Victoria*, Vol. 28, 1915, Part I, pp. 139-148. Melbourne.

INDEX

A

Abbot, C. G., 197
Abbott, C. C., 272
Abo, University of, 375
Abu Zabad, *map,* 60
Abyssinia, 335
Adames, H. B., 355
Adamson, R. S., 355
Addicks, Tex., topographic sheet, *map,* 121
Addison, S. W., 61
Adige River
  Upper district, 132, 139
  Upper, nationalities, 141
  Upper, place names (Tolomei), *bibliogr.,* 124
Adirondacks
  Fell-fields, 239
  Glaciation (Johnson), *bibliogr.,* 272
  Graphite deposits (Alling), *bibliogr.,* 272
Administrative subdivisions, proposed new England (Fawcett), *bibliogr.,* 425
  Europe (with maps), *note,* 114
Adriatic coast
  Italy's viewpoint (Baratta and others), *bibliogr.,* 192
  Vlakhs (Giuffrida-Ruggeri), *bibliogr.,* 275
Advent Bay, 317, 318
Advent City, 317
Aero Club of America, 149, 155, 158, 186 (*note*)
Aërography
  Uniform records and scientific units (McAdie), *bibliogr.,* 197
Aërology
  Free-air data, *note,* 182
  Free-air data at Drexel (Gregg), *bibliogr.,* 188
Africa
  África Occidental Española (Río Joan), *rev.,* 429
  Air routes, *note,* 266
  Anglo-Egyptian Sudan, *map,* 60
  Atmospheric pressure and air circulation over northern (Lyons), *bibliogr.,* 59
  Backbone (Sharpe), *bibliogr.,* 429
  Bantus of West Africa (Mackenzie), *bibliogr.,* 59
  Bibliography, 59, 60, 430
  Climat, Le, de l'Afrique occidentale et équatoriale (Chudeau), *rev.,* 276
  Guide, The, to South and East Africa, for the use of tourists, sportsmen, invalids, and settlers: 1916 edit. (Brown), *rev.,* 59
  Languages (Meinhof), *bibliogr.,* 60
  Lure, The, of Africa (Patton), *rev.,* 277
  Nel Mar Rosso: Rendiconto di una missione inviata dalla Società Africana d'Italia, Aprile-Luglio, 1913 (Cufino), *rev.,* 59
Africa (*continued*)
  North coast; route toward central Africa (Smyth), *bibliogr.,* 278
  Pan-Germanism (Thierry), *bibliogr.,* 430
  Physical boundaries in, 208
  Pioneering in the Congo (Springer), *rev.,* 429
  Railway development (Metcalfe), *bibliogr.,* 60
  Settlement (Buxton), *bibliogr.,* 429
African West Coast. *See* Liberia
Agriculture
  "Atlas of American Agriculture," 339, 344, 348
  British, after the war (Hall), *bibliogr.,* 58
  Colorado (Robbins), *bibliogr.,* 353
  Finland, 368
  Palestine, 30
  Southern long-leaf pine belt, 85
  Tropical (Proceedings, etc.; Wilcox), *bibliogr.,* 199
  Weather and (Azzi), *bibliogr.,* 192
  See also Crops; Farmers and farming
Agua Fria, Tex., topographic sheet, *map,* 121
Aguaje (Lavalle y García), *bibliogr.,* 424
Air
  Exploration of the upper, 256
  See Aërology; Atmospheric pressure; Meteorology
Airplanes, 149
  Altitudes reached by, 152, 156
  Arctic expedition, proposed, *note,* 186
  Himalaya, landing on the, 158
  Lecture on, *note,* 181
  Russian (ill.), 154
  San Diego, flying at (ill.), 150
  See also Aviation
Akeley, C. E., 187
Alabama
  Gantts Quarry topographic sheet, *map,* 120
Åland Islands, 362, 363, 369, 376
Alaska
  Bibliography, 351
  Chitina valley (Moffit), *bibliogr.,* 351
  Cosna-Nowitka region, The (Eakin), *rev.,* 350
  In the Alaskan wilderness (Gordon), *rev.,* 350
  Lake Clark-Central Kuskokwim region, The (Smith), *rev.,* 350
  Lower Matanuska Valley topographic sheet, *map,* 351
  Maps, 351
  Mining (Golder), *bibliogr.,* 351
  Mountain exploration (Brooks), *bibliogr.,* 351
  Rockies and other mountains, 410, 411
  Volcanoes (Dall), *bibliogr.,* 351
Alaska (ship), 297

- Albania
  - Italian occupation (Almagià), *bibliogr.*, 275
  - *Map*, 276
  - Recent observations (Scriven), *bibliogr.*, 276
- Albert, A. R., 189
- Albes, Edward, 121
- Alcock, John, *note*, 421
- Aleutian Range, 412
- Allenstein, 284
  - Plebiscite area, 285
- Alling, H. L., 272
- Allix, A., 273
- Almagià, Roberto, 275
- Alpine flora. *See* Fell-fields
- Alps
  - As a boundary, 209
  - Bavarian (Mylius), *bibliogr.*, 428
  - Bibliography, 191, 192
  - Cima Tosa (Laeng), *bibliogr.*, 123
  - Equi, Apuan Alps (De Stefani), *bibliogr.*, 123
  - Fell-fields, 237
  - French, regional study of Vizille and the Romanche basin (Allix), *bibliogr.*, 273
  - French, snowfall (Bénévent), *bibliogr.*, 273
  - Maritime: glaciers (Roccati; Sacco), *bibliogr.*, 191
  - Medieval colonization, 129, 130
  - Passes of western and central (Freshfield), *bibliogr.*, 191
  - Political function (Lorenzi), *bibliogr.*, 191
  - Ruitor glacier lakes (Preller), *bibliogr.*, 124
  - Val Grosina (Corti and Laeng), *bibliogr.*, 193
  - Verkehrsgeschichte der Alpen, Vols. 1 and 2 (Scheffel), *rev.*, 190
  - Waldensian valleys, *note*, 265
- Alsace-Lorraine
  - Emigration and immigration (Vidal de la Blache), *bibliogr.*, 428
  - Peace treaty provision for restoration to France, 282
  - Question, The, of Alsace and Lorraine (Balch), *rev.*, 427
- Altenburg, Ill., topographic sheet, *map*, 189
- Altitude
  - Airplanes, 152, 156
  - As climatic control in the United States, *note*, 263
  - Physiological difficulties (Kellas), *bibliogr.*, 195
- Alto Adige. *See* Adige River
- Alvarez, H. H., 121
- Amara, Mt., 335
- America
  - Growth, 36
  - *See also* Americas, The; United States
- American Association for the Advancement of Science, 107
- American Geographers. *See* Association of American Geographers
- American Geographical Society
  - Annual meeting and reports, Jan. 21, 1919, *note*, 110
  - April meetings, *note*, 345
  - Contribution to the peace conference (with map), 1-10
  - Council's annual report, *note*, 110
  - December meetings and Daly medal presentation, *note*, 49
  - Early maps of Scotland, *note*, 266
  - February meetings, *note*, 181
  - January meetings and reports, *note*, 110
  - Lecturers in 1918, *note*, 111
  - March meetings and lectures, *note*, 262
  - Medal awards, Cullum, Daly, Livingstone, *notes*, 110, 262
  - Membership, *note*, 111, 112
  - Officers elected, Jan., 1919, *note*, 112
  - Presentation of Cullum medal to E. de Margerie at Paris, *note*, 416
  - Publication of the *Journal of Geography*, *note*, 50
  - Special committee's report, *note*, 112
  - Treasurer's report for 1918, *note*, 111
- *American Journal of Science*, Centennial Number, *note*, 421
- Americas, The
  - Basques in exploration, etc. (Chandler), *bibliogr.*, 128
  - Investments in Latin America and British West Indies (Halsey), *bibliogr.*, 128
  - Panamericanismo, El: Su pasado y su porvenir (Calderón), *rev.*, 127
  - Physical boundaries in, 207
- Ammunition, economy of, 308
- Andacollo, 77
- Andersson Gunnar
  - Australien, natur och kultur: Studier och minnen, *rev.*, 431
- Andes
  - Bolivian, age (Berry), *bibliogr.*, 56
  - Fossil plants from Bolivia and . . . . the uplift of the eastern Andes (Berry), *rev.*, 353
  - Peruvian, uplift (Lisson), *bibliogr.*, 354
- Andes, Central
  - Fairs of the Central Andes (with map and ills.) (Wrigley), 65-80
  - Map showing towns holding fairs; also railroads (map), 67
- Andrews, M. C., 426
- Andriani, Giuseppe, 192
- Anfossi, Giovanni, 191, 192, 427
- Angkor
  - Ruins (Groslier), *bibliogr.*, 357
- Anglo-Egyptian Sudan, *map*, 60
- Anian, Strait of
  - Marinelli, O., *bibliogr.*, 200
- Animals
  - Arctic life, 296
- Annam
  - Young coasts, The, of Annam and northern Spain (Davis), 176-180
- Annoni, A. M., 275
- Annunzio, Gabriele d', 151

- Anthropogeography
  - Bibliography, *bibliogr.*, 360
  - Pellice River valley (Roletto), *bibliogr.*, 124
- Anthropology
  - Art and man: Comparative art studies (Balch), *rev.*, 359
  - Bibliography, 360
  - Incas (Bingham), *bibliogr.*, 56
  - Metrópoli prehistórica, Una, en la América del Sud (Posnansky), *rev.*, 55
  - Papuans of Dutch New Guinea (Broek), *bibliogr.*, 358
  - Queensland (Hamlyn-Harris), *bibliogr.*, 61
  - *See also* Ethnology
- Anticyclones. *See* Storms
- Antillia, 99, 103
- Antiquities
  - Southwestern architecture (Fewkes), *bibliogr.*, 190
- Aosta
  - Valley of (Novarese), *bibliogr.*, 124
- Apennines
  - Lake evaporation (Anfossi), *bibliogr.*, 192
  - Lakes (Anfossi), *bibliogr.*, 192
- Apuan Alps. *See under* Alps
- Arabian Sea
  - Cyclones (Gallé), *bibliogr.*, 127
- Arbos, P., 192
- Archeology
  - Delaware River dune (Abbott), *bibliogr.*, 272
  - Mexican bureau created, *note*, 267
  - *See also* Prehistory
- Architecture
  - Southwest, prehistoric types (Fewkes), *bibliogr.*, 190
  - *See also* Houses
- Arctic
  - Exploration by airplane, 149, 151
  - "Living off the country" as a method of Arctic exploration (with ills.) (Stefánsson), 291-310
  - Proposed polar expedition by airplane, *note*, 186
  - *See also* Greenland
- Arctic Coal Co., 318
- Arctic foxes, 305
  - On sea ice (ill.), 305
- Arctic Range, 410
- Areal science, 170
- *Arenaria groenlandica* (ill.), 255
- Arfak Mountains
  - Flora (Gibbs), *bibliogr.*, 358
- Argentina
  - Bibliography, 121-123
  - Guide (Martinez), *bibliogr.*, 123
  - Immigration européenne, L', en Argentine (Berne), *rev.*, 121
  - Petroleum, *note*, 183
  - Weather service (Clayton), *bibliogr.*, 122
- Arizona
  - Mountains, 406
  - Ruins (Colton), *bibliogr.*, 351
  - Signposting in deserts, *note*, 262
- Armament
  - Germany in the Iron Age (Jahn), *bibliogr.*, 427
- Armstrong, H. E., 125
- Arnold, Ralph, 198
- Art
  - Art and man: Comparative art studies (Balch), *rev.*, 359
  - Peruvian, ancient (Means), *bibliogr.*, 354
- Ashiret highlands, Mesopotamia (Wigram), *bibliogr.*, 61
- Ashley, G. H., 119
- Ashley-Smith explorations (Dale), *bibliogr.*, 270
- Asia
  - Atmospheric pressure and rainfall (Eckhardt), *bibliogr.*, 195
  - Bibliography, 195
  - Grande Géographie Bong illustrée, Vol. 3 (Reclus), *rev.*, 194
  - Oxford survey of the British Empire, The: Asia, etc. (Herbertson and Howarth), *rev.*, 193
  - Physical boundaries in, 208
  - Russia, Germany, and Asia, *bibliogr.*, 62
  - Russo-Japanese treaty, importance (Rivetta), *bibliogr.*, 195
  - Trade and the occupation of the Pacific coast (Cleland), *bibliogr.*, 55
- Asia Minor. *See* Turkey in Asia
- Assam and Bhutan topographic sheet 78 J, *map*, 280
- Associated Mountaineering Clubs, *note*, 418
- Association of American Geographers
  - *Annals*, *note*, 110
  - Baltimore meeting, Dec. 27 and 28, 1918, 107-109
  - Officers for 1919, *note*, 266
- Astronomical geography
  - South Australia (Dodwell), *bibliogr.*, 125
- Atacama, Puna de
  - Mineral deposits (Barnabe), *bibliogr.*, 122
- Atlantic Ocean
  - Certain pre-Columbian notices of the inhabitants of the Atlantic islands (Babcock), *rev.*, 126
  - *Michael Sars* in North Atlantic (Gravier), *bibliogr.*, 127
  - Mythical islands (Babcock), *bibliogr.*, 126
  - North Atlantic Drift and Gulf Stream (Loft), *bibliogr.*, 127
- Atlas Mountains
  - High Atlas, crossing by airplane, 149
  - View from an airplane (ill.), 155
- Atlases
  - "Atlas of American Agriculture," 339, 344, 348
  - China (Dingle), *map*, 61
  - *See also* Reclus, Onésime
- Atmosphere
  - Kiel (Müns), *bibliogr.*, 428
  - Motion and circulation (Paine), *bibliogr.*, 197
- Atmospheric pressure
  - Asia (Eckhardt), *bibliogr.*, 195
  - Benson, Oxon. (Bilham), *bibliogr.*, 355

Atmospheric pressure (*continued*)
  Northern Africa (Lyons), *bibliogr.*, 59
  Relation to wind, etc. (Shaw), *bibliogr.*, 198
  Twelve-hourly barometer oscillation (Simpson), *bibliogr.*, 198
  United States, mean values (Gregg), *bibliogr.*, 270
Atolls. *See* Coral islands and reefs
Atwood, W. W.
  Geography in America, 36-43
Auckland Islands
  Visit to (Mortensen), *bibliogr.*, 432
Augusta, Me., 164
Aurora-borealis expedition of 1913; (Störmer), *bibliogr.*, 429
Australasia
  Dominant winds in January and July (maps), 260, 261
Australia
  Air routes to Australia (with maps) (Taylor), 256-261
  Australien, natur och kultur: Studier och minnen (Andersson), *rev.*, 431
  Bibliography, 61, 125, 126, 432
  Central, exploration (Day), *bibliogr.*, 125
  Discovery (Beltrán y Rózpide), *bibliogr.*, 432
  Economic development of western (Piccoli), *bibliogr.*, 432
  Exploration, Captain White's work (Shufeldt), *bibliogr.*, 432
  Exploration in northwest (Basedow), *bibliogr.*, 125
  Faunal subregions (Sloane), *bibliogr.*, 432
  Great Australian Artesian Basin, geology (Jack), *bibliogr.*, 126
  Great barrier reef (Davis), *bibliogr.*, 125
  Gregory, J. W., *bibliogr.*, 61
  Irrigation scheme, *bibliogr.*, 125
  Meteorological flights (Taylor), *bibliogr.*, 126
  New Pacific, The: British policy and German aims (Fletcher), *rev.*, 124
  Results of rainfall observations made in South Australia and the Northern Territory, etc. (Hunt), *rev.*, 432
  Seismology (Komorowicz), *bibliogr.*, 432
  Settlement of South Australia (Lewis), *bibliogr.*, 432
  Short history of Australia, A (Scott), *rev.*, 125
  Sylvanus' projection showing isolation (map), 257
  Visit of the British Association (Armstrong), *bibliogr.*, 125
  Western, "dry" lakes (Jutson), *bibliogr.*, 126
Autumn
  China, 17
  First killing frost in the United States (with map), 342, 343
Averdunk, H., and J. Müller-Reinhard
  Gerhard Mercator und die Geographen unter seinen Nachkommen, *rev.*, 199
Aviation
  Air routes to Australia (with maps) (Taylor), 256-261
  Australia, meteorology (Flockart and others), *bibliogr.*, 61
  Australia, meteorology (Taylor), *bibliogr.*, 126
  Cape-to-Cairo air route, *note*, 266
  High-altitude flying in relation to exploration (with diagrs. and ills.) (Woodhouse), 149-158
  Italy's opening of school of aëronautics (Eredia), *bibliogr.*, 123
  Meteorology and, *note*, 182
  Ocean weather reports and forecasts, *note*, 421
  Transatlantic flights, *note*, 419
Avity, Pierre d'. *See* Davity
Aydelotte, Frank, 7
Aymara Indians, *note*, 113
Azores
  Occurrence of name "Seven Cities," 104
Azzi, Gerolamo, 192, 275

B

Babcock, W. H., 126
  Certain pre-Columbian notices of the inhabitants of the Atlantic islands, *rev.*, 126
  Island of the Seven Cities, The (with maps), 98-106
Bachka, the, 92, 96
Backward nations
  Palestine, 34
Bacon, G. W., 427
Baden
  Vegetation study (Eichler and others), *bibliogr.*, 427
Bagdad Railway
  War, The, and the Bagdad Railway: The story of Asia Minor and its relation to the present conflict (Jastrow), *rev.*, 60, 360
Bagley, J. W., 107
Baharia
  Cultivated lands, *maps*, 278
Baillie Island
  Food caches (ill.), 294
Baker, C. L., 120
Baker, O. E., 108, 270, 345
Balch, E. S., and E. M. Balch
  Art and man: Comparative art studies, *rev.*, 359
Balch, T. W.
  The question of Alsace and Lorraine, *rev.*, 427
Balkan Peninsula
  Communications in (Woods), *bibliogr.*, 276
  Ethnographic problems (Musoni), *bibliogr.*, 275
  Glacial epoch (Cvijić), *bibliogr.*, 275
  Slav invasion, 91
  Slav peoples (Gallois), *bibliogr.*, 275
  Theatre of war in, *map*, 276

Balkan states
  Bibliography, 275-276
  Reconstruction, The, of South-Eastern Europe (Savić), *rev.*, 274
Ball, John, 278
Ballivian, M. V., 56, 113
Baltic Sea
  Coastal veneers, 217
Baltimore
  Association of American Geographers, meeting Dec. 27 and 28, 1918, 107-109
Banat, the, 92, 96
Bandelier, A. F., 56
Bangor, Me., 164
Bantus
  Mackenzie, J. K., *bibliogr.*, 59
Baratta, Mario, 192
Barents, Willem, 311, 312
Barnabe, J. F., 122
Barnes, J. B.
  Elements of military sketching and map reading, *rev.*, 63
Barometer
  Twelve-hourly oscillation (Simpson), *bibliogr.*, 198
Barrecchia, B., 274
Barrell, Joseph, 280
Barrows, H. H. *See* Salisbury, R. D., and H. H. Barrows
Bartholomew, J. G., 187
Bartlett, R. A., 151, 155, 186 (*note*)
Bartold, V. V., 357
Barwise School, Tex., topographic sheet, *map*, 121
Bas-Maine
  Le Bas-Maine: Étude géographique (Musset), *rev.*, 272
Basedow, Herbert, 125
Basques
  Rôle in exploration of Spanish America (Chandler), *bibliogr.*, 128
  Whaling in Spitsbergen, 314
Bastin, E. S., 162, 165, 167
Bayless, S. E., 56
Bavaria
  Alps (Mylius), *bibliogr.*, 428
  Lakes (Fels), *bibliogr.*, 427
Bazzano, Hamlet, 122
Beaches
  Lake Michigan, abandoned (Wright), *bibliogr.*, 189
Beagle Channel
  Chile's claim to the islands south of (Guerra), *bibliogr.*, 122
Bear Island (Arctic), 311, 319
Bears. *See* Polar bears
Beccari, O., 359
Beck, R. H., 122
Beebe, William, *note*, 183
Beer, G. L., 3
Belden, C. J.
  The Tioga Road across the Sierra Nevada (with map and ills.), 377-386
Belfast, Me., 164
  Topographic sheet, *map*, 272
Belgium
  Canals and navigable rivers (Barrecchia), *map*, 274
  Districts prescribed by treaty for Germany's cession, 281
  Resumption of publication of *Le Mouvement Géographique*, *note*, 421
  See also War, the
Bell, Archie, 277
Belloc, Hilaire, 427
Beltrán y Rózpide, Ricardo, 432
Bénévent, E., 192, 273
Bengal topographic sheet 78 H, *map*, 280
Bengal and Assam topographic sheet 78 G, *map*, 280
Bengtson, N. A., 108
Benson, Engl.
  Atmospheric pressure (Bilham), *bibliogr.*, 355
Benson, W. N., 125
Bent, Allen H.
  The unexplored mountains of North America, 403-412
Benton, John, 279
Berenda, Cal., topographic sheet, *map*, 190
Berkeley, Cal.
  Rainfall data (Reed), *bibliogr.*, 190
Berlin
  Eccentric position, 284
  Regional study (Fleure), *bibliogr.*, 427
Berne, Pierre
  L'immigration européenne en Argentine, *rev.*, 121
Berry, E. W., 53, 56
  Fossil plants from Bolivia and their bearing upon the age of uplift of the eastern Andes, *rev.*, 353
Berry, S. S. 125
Bianchi, Adele, 192
Bibliographies
  Boundary making, 218
  Davity's "Les estats, etc.", 337
  Frost in the United States, footnote reference, 344
  Geology, mineralogy, and paleontology of Uruguay (Marstrander), *bibliogr.*, 123
  Libya (Ceccherini), *bibliogr.*, 277
  Margerie's works, *bibliogr.*, 200
  Oklahoma geology (Trout and Myers), *bibliogr.*, 120
  Wyoming geology (Bovee), *bibliogr.*, 55
Biddle, Clement, 358
Biermann, Ch., 360
Big Hatchet Peak, N. M., topographic sheet, *map*, 353
Bilham, E. G., 355
Bingham, Hiram, 56
Biography. *See* History of geography and exploration
Biology
  Open field work, *note*, 183
Birds
  Cape Horn quest (Beck), *bibliogr.*, 122
  Dry Tortugas, *note*, 418
  Falkland Islands, photographing (Beck), *bibliogr.*, 122

Bishop, J. B., 272
Blache. *See* Vidal de la Blache
Blanc, ——, 358
Blanc, Édouard, 278
Blanchard, Raoul, 273
Bliss Ranch, Cal., topographic sheet, *map,* 353
Block diagrams
  Problem areas in Europe, Asia, and Africa, prepared by the Amer. Geogr. Soc., 5
Blue-grass region
  Commerce, 1810-20 (Gronert), *bibliogr.,* 423
Boardman, W. C., 189
Boats
  Arctic sled covered with tarpaulin (ill.), 299
  See also Shipping
Bocage, 272, 273
Bocage, Barbie du, *note,* 266
Bogalusa, La., 85
Bogs
  Raised bogs in eastern Maine (with ills.) (Nichols), 159-167
Bolivia
  Andes, age (Berry), *bibliogr.,* 56
  Bibliography, 56, 354, 424
  Bolivia, the heart of a continent, etc. (Reid), *rev.,* 424
  Boundary with Peru (Holdich), *bibliogr.,* 56
  Brandes, A., *bibliogr.,* 56
  Descriptive data, *bibliogr.,* 56
  Fossil plants and . . . the uplift of the eastern Andes (Berry), *rev.,* 353
  Indians, *note,* 112
  Indians (Nordenskiöld), *bibliogr.,* 425
  Lowlands, *bibliogr.,* 56
  Markets, 78, 79, 80
  Meteorology (Lurquin), *bibliogr.,* 354
  Metrópoli prehistórica, Una, en la América del Sud (Posnansky), *rev.,* 55
  Potato culture (Ballivián and Tovar), *bibliogr.,* 56
  Railways (Reid), *bibliogr.,* 425
Bonacina, L. C. W., 355
Bonarelli, Guido, 122
Bone Spring, Tex., topographic sheet, *map,* 121
Bong. *See* Reclus, Onésime
Bonsteel, J. A., 272
Bonthron, P., 355
Booy, Theodoor de
  Note, 111, 112
  Obituary, 268
Bordeaux
  Blanchard, R., *bibliogr.,* 273
Borgå (ill.), 370
Böse, Emil, 120
Bosnians, 94
Bosporus. *See* Constantinople
Bossekop
  Aurora-borealis expedition of 1913 (Störmer), *bibliogr.,* 429
Botero, Giovanni, 330
Boucher, E. S., 192
Boulders
  Pavements on upper Mackenzie River, *note,* 346
Boundaries
  British Empire (Bunting and Collen), *bibliogr.,* 62
  Egypt, northwest (Cana), *bibliogr.,* 277
  Fairs at frontiers, 78
  Germany, The new boundaries of, according to the peace treaty (with map), 281-290
  Italy and the Alps, 132
  Northern Italy, ethnographic (map), opp. 144
  Peru-Bolivia (Holdich), *bibliogr.,* 56
  Principles in the determination of boundaries (with bibliogr.) (Brigham), 201-219
  Proposed subdivisions of England, France, and Germany (with maps), *note,* 114
  See also under Europe
Boundary Peak, 405
Bovee, G. G., 55
Bowie, William, 63
Bowles, Oliver, 270
Bowman, H. H. M., 418
Bowman, Isaiah, 2, 3, 10, 50, 110, 417 (*note*)
Bows
  Eskimo at Coronation Gulf (ills.), 307
Bozen, 141
Bradley, W. W., 351
Brahmaputra River
  Braided character of stream (map), 280
  Tribes of the valley (Dunbar), *bibliogr.,* 279
Brake, J., 61
Brandes, A., 56
Brazil
  Bibliography, 57
  Brazil today and tomorrow (Elliott), *rev.,* 57
  Climate of northeastern (Crandall), *bibliogr.,* 57
  Descriptive data, *bibliogr.,* 57
  Dutch rule (Lyra), *bibliogr.,* 57
  Geography as related to political and economic development (Carvalho), *bibliogr.,* 57
  Meteorology and climatology (Chisholm), *bibliogr.,* 57
Brazil (island), 98, 102, 104
Breckland
  Vegetation (Farrow), *bibliogr.,* 425
Breckwoldt, John, 427
Brenta Alps
  Cima Tosa (Laeng), *bibliogr.,* 123
Brenta River
  Italian front to Piave River, *map,* 124
Brian, Alessandro, 192
Bridgman, H. L., 118
Briggs, L. J. *See* Kearney, T. H., and others
Brigham, A. P., 108
  Principles in the determination of boundaries (with bibliogr.), 201-219
Brigham, W. T.
  Personal, 267
British Association for the Advancement of Science
  Australian visit (Armstrong), *bibliogr.,* 125

British Columbia
  Coast Range, 408
British Columbia Mountaineering Club, 408
British Empire
  Geography (Bunting and Collen), *bibliogr.*, 62
  Oxford survey of the British Empire, The: Asia, etc. (Herbertson and Howarth), *rev.*, 193
  Oxford survey, etc., (1) General survey; (2) British Isles and Mediterranean possessions (Herbertson and Howarth), *rev.*, 61
  Palestine and, 24
  Resources (Grice), *bibliogr.*, 128
  See also Australasia; British Isles; England; Great Britain; Mediterranean Sea
British Guiana
  Tropical Research Station reopened, *note*, 183
British Isles
  Agriculture after the war (Hall), *bibliogr.*, 58
  Bibliography, 58, 355, 425, 426
  Channel tunnel (Fox), *bibliogr.*, 58
  Inverse weather phenomena (Bonacina), *bibliogr.*, 355
  On the distribution of rain, etc., 1917 (Mill and Salter: *British Rainfall*, Vol. 57), *rev.*, 354
  Oxford Survey, etc., British Isles and Mediterranean possessions (Herbertson and Howarth), *rev.*, 61
  Rainfall as affected by gunfire, *note*, 51
  Temperature, abnormal (Bryant), *bibliogr.*, 355
British Mountains, 410
British West Indies. *See under* West Indies
Brizio, F. A., 277
Broek, A. J. P. van den, 358
Brooks, A. H., 350, 351
Brooks, C. E., 358
Brooks, C. E. P., 128
Brooks, C. F., 107, 270, 340
Brown, A. S. and G. G.
  Guide, The, to South and East Africa, for the use of tourists, sportsmen, invalids, and settlers: 1916 edit., *rev.*, 59
Brown, A. W., *note*, 421
Brown, Ernest, 63
Brown, G. G. *See* Brown, A. S. and G. G.
Brown, J. MacMillan, 358
Brown, R. N. Rudmose
  Spitsbergen, *terra nullius* (with map), 311-321
Bruce, W. S., 316, 317
Brückner, Eduard, 346
Brunhes, Jean, 64
Bryant, W. W., 355
Buck Hill, Tex., topographic sheet, *map*, 121
Buenos Aires
  In 1536 (Cardoso), *bibliogr.*, 122
Buenos Aires (province)
  Oceanography of the coast (Kantor), *bibliogr.*, 122
Buildings. *See* Houses
Bulgaria
  Azzi, G., *bibliogr.*, 275
  Case of (Tsanoff), *bibliogr.*, 276
Bulgarians, 91, 95
Bullis Gap, Tex., topographic sheet, *map*, 423
Bunting, W. L., 62
Burkburnett, Texas-Oklahoma, topographic sheet, *map*, 121
Burma
  Bibliography, 357, 358
Burrard, Sir Sidney, 195
Burton, H.
  Personal, 267
Buser, A. L., 189
Buxton, Noel, 429

C

Cabrini, Angiolo, 192
Caciques, 71, 73
Cadell, H. M., 355
Cairo. *See* Cape-to-Cairo air route
Calais, Me., 165
Calcutta
  Air route stations to Canberra, 258
Calderón, F. G.
  El panamericanismo: Su pasado y su porvenir, *rev.*, 127
California
  Acquisition (Cleland), *bibliogr.*, 55
  Berenda, Lingard, Owens Creek, and Spring Valley topographic sheets, *maps*, 190
  Bliss Ranch, Denverton, Honker Bay, Point Reyes, Point Sur, Powell Slough, Snelling, and Turner Ranch topographic sheets, *maps*, 353
  Commercial geography of southern (Rolfe), *bibliogr.*, 190
  Dune vegetation (Ramaley), *bibliogr.*, 352
  Larkin's description (Cleland), *bibliogr.*, 55
  Minerals, 1917 (Bradley), *bibliogr.*, 351
  Mountains in eastern, 405
  Signposting in deserts, *note*, 262
Caliphate, 29
Calvert, A. S., and P. P. Calvert
  A year of Costa Rican natural history, *rev.*, 423
Calvert, P. P. *See* Calvert, A. S., and P. P. Calvert
Cambodia
  Archeology (Groslier), *bibliogr.*, 357
  Kandal Residency, *bibliogr.*, 357
Camino Sierra, El, 386
Camp Bowie
  Geology (Shuler), *bibliogr.*, 120
Camp Funston
  Environment (Moore), *bibliogr.*, 189
Camp Grant
  The environment of Camp Grant (Salisbury and Barrows), *rev.*, 188
Campbell Island
  Visit to (Mortensen), *bibliogr.*, 432
Campos do Jordão, Brazil
  Climate (Godinho), *bibliogr.*, 57

- Camps
  - Eskimo summer camp with fish drying (ill.), 295
  - Eskimos in Canadian tundra (ill.), 294
  - Polar bears as visitors, 306
- Cana, F. R., 277
- Canadian Arctic Expedition
  - Activities, references to, 291
- Canadian Rockies, 407
- Canals
  - France and Belgium (Barrecchia), *map*, 274
  - Holidays on British (Bonthron), *bibliogr.*, 355
  - India, Punjab system (Benton), *bibliogr.*, 279
  - Saima, 374
- Canavari, Igino, 192
- Canberra
  - Air route stations to Calcutta, 258
- Cantabrian coast, 178, 179
- Cape. *See* name of cape
- Cape-to-Cairo air route, *note*, 266
- Capra, Giuseppe, 57
- Capri
  - Shore lines (Kranz), *bibliogr.*, 123
- Caraveli
  - Earthquake region (Umlauff), *bibliogr.*, 425
- Cardoso, Aníbal, 122
- Cariboo Range, 408
- Caribou
  - Eskimo blind for shooting (ill.), 309
  - Feeding in tundra (ill.), 308
  - Hunting, 310
- *Carnegie* (ship), 128
- Carnegie Institution
  - Year Book, 1916, *bibliogr.*, 128
- Carolinas, the
  - Tennessee River, The, as the road to Carolina: The beginnings of exploration and trade (Crane), *rev.*, 119
- Carso. *See* Karst
- Carter, Huntley, 274
- Cartography
  - Bibliography, 63
  - Early maps of Scotland, *note*, 266
  - Elements of military sketching and map reading (Barnes), *rev.*, 63
  - Genoa and Corsica, eighteenth century (Brian), *bibliogr.*, 192
  - Italy (De Magistris), *bibliogr.*, 123
  - Military sketching and map reading (Grieves), *rev.*, 63
  - Ordnance maps, reading (Unstead), *bibliogr.*, 63
  - Scotland, early maps (Inglis), *bibliogr.*, 426
  - Training manual (Spalding), *bibliogr.*, 63
- Carvajal, M. M., 56
- Carvalho, C. M. D. de, 57
- Cary, Merritt, 55
- Cassiterides, 426
- Castillo, I. B. del, 118
- Catskill Mountains
  - Glaciation (Johnson), *bibliogr.*, 272
- Cattle. *See* Live stock
- Ceccherini, Ugo, 277
- Cedar Springs, Mich., topographic sheet, *map*, 189
- Cement
  - Rock quarrying for (Bowles), *bibliogr.*, 270
- Census
  - Finland, *bibliogr.*, 428
  - Germany, *bibliogr.*, 428
  - India, 1911 (Gait), *rev.*, 196
- Central America
  - Bibliography, 423, 424
- Central Andes. *See* Andes, Central
- Cephalopoda
  - Report by the F. I. S. *Endeavour* of results in Australian regions (Berry), *bibliogr.*, 125
- *Chacras*, 71
- Challapata, 69
- Chambard, Clément, 274
- Chamber of Commerce
  - New York (state), 1768-1918 (Bishop), *bibliogr.*, 272
- Chancellor, Richard, 311
- Chandler, C. L., 128
- Chapman, S., 197
- Checchia-Rispoli, G., 192
- Chengtu, *note*, 185, 186
- Cherryfield, Me., 165
- Chile
  - Bibliography, 122
  - Descriptive data, *bibliogr.*, 122
  - Rainfall, *note*, 264
  - Rainfall summary, 1849-1915, *bibliogr.*, 122
  - Weather service (Knoche), *bibliogr.*, 122
- China
  - Atlas and gazetteer (Dingle), *map*, 61
  - Autumn, 17
  - Enchantment, The, of the old order (with ills.) (Tisdale), 11-23
  - Forests and floods, relation, *note*, 348
  - Machatschek, F., *bibliogr.*, 195
  - Population, *note*, 52
  - Proposed railroad to . . . . Szechwan, *note*, 185-186
- Chincha Valley
  - Study (Portocarrero), *bibliogr.*, 425
- Chinese
  - Origin (Tai), *bibliogr.*, 195
  - Origin, with references to discussion of theories, *note*, 51
- Chisholm, G. G., 40, 57, 187, 280
- Chitina River
  - Upper valley (Moffit), *bibliogr.*, 351
- Choctaws
  - Early account (Swanton), *bibliogr.*, 120
- Chudeau, R.
  - Le climat de l'Afrique occidentale et équatoriale, *rev.*, 276
- Chungking, *note*, 185, 186
- *Chuño*, 69, 76
- Church, J. E., Jr., 55
- Churchill, William, 108, 358
- Cibola, 103, 105
- Cienega Springs, N. M., topographic sheet, *map*, 353

Cima Tosa
  Laeng, G., *bibliogr.*, 123
Citati, Pietro, 195
Cities
  China, 11
  France (Lyons, Marseilles, Nice) (Blanchard), *bibliogr.*, 273
  Island, The, of the Seven Cities (with maps) (Babcock), 98-106
Civilization
  Geographic frame (Biermann), *bibliogr.*, 360
  Three stages, 201
Clapp, F. G., 182
Clara, Texas-Oklahoma, topographic sheet, *map*, 121
Clark, J. E., 355
Clarksburg, W. Va.
  Deep well, *note*, 417
Clayton, H. H., 122
Cleland, R. G., 55
Clerget, Pierre, 274
Climate
  Brazil, northeastern (Crandall), *bibliogr.*, 57
  British Isles (Clark and Adames), *bibliogr.*, 355
  Campos do Jordão, São Paulo, Brazil (Godinho), *bibliogr.*, 57
  Climat, Le, de l'Afrique occidentale et équatoriale (Chudeau), *rev.*, 276
  Crops and, in the United States, *note*, 345
  Hawaii and white residents, *note*, 418
  Italy (Eredia), *bibliogr.*, 123
  Liberia, The climate of, and its effect on man (with ills.) (Ross), 387-402
  Montevideo, *note*, 113
  Palestine, 31
  Palestine, ancient, *note*, 347
  Relation to man (Ward), *bibliogr.*, 198
  Tertiary ape-man and (Barrell), *bibliogr.*, 280
  United States, major controls, *note*, 263
  United States, major controls (Ward), *bibliogr.*, 271
  See also Temperature
Climatology
  Brazil (Chisholm), *bibliogr.*, 57
  Cotton plant, *note*, 348
  Gebel River (Eredia), *bibliogr.*, 277
  Peene River region (Levin), *bibliogr.*, 428
  St. Gall (Roemer), *bibliogr.*, 191
  Value in the war, 38
  See also Meteorology; Rainfall; U. S. Weather Bureau; Weather
Cline, I. M., 119
Cliza, 70
Cloquet, Minn., 227
  District devastated by fire (ill.), 226
Coal
  England, search for (Strahan), *bibliogr.*, 426
  Peru (Léon), *bibliogr.*, 57
  Santo Tomas, Texas (Ashley), *bibliogr.*, 119
  Scania, Sweden (Grönwall), *bibliogr.*, 428
  Spitsbergen, 317
Coal (*continued*)
  United States, 1916 (Lesher), *bibliogr.*, 271
  World's coaling stations, strategic importance, *bibliogr.*, 62
Coan, T. M., 419
Coast Range of British Columbia, 408
Coasts
  Capri (Kranz), *bibliogr.*, 123
  New Jersey, protection (Cresson), *bibliogr.*, 272
  Wellington (province), N. Z. (Cotton), *bibliogr.*, 125
  Young coasts, The, of Annam and northern Spain (Davis), 176-180
Coati. *See* Koati
Coconino forest ruins (Colton), *bibliogr.*, 351
Col d'Hérens
  Coolidge, W. A. B., *bibliogr.*, 191
Colamonico, Carmelo, 192, 193
Cold
  Winter of 1917-18, *note*, 182
  Winter of 1917 in Scandinavia (Rabot), *bibliogr.*, 429
Coleman, A. P., 403
College Corner, Indiana-Ohio, topographic sheet, *map*, 189
Colleges. *See* Universities
Collen, H. L., 62
Collie, J. N., 408
Collier, A. J., 351
Colonies
  French, commerce (Vergnes), *bibliogr.*, 62
Colonization
  Alps, medieval, 129, 130
  Germans in the Alps, 131
  Hakluyt as pioneer (Watson), *bibliogr.*, 200
  Italian, in Africa (Giannitrapani), *bibliogr.*, 59
  Italians in São Pàulo, Brazil (Capra), *bibliogr.*, 57
  Siberia (Blanc), *bibliogr.*, 278
  Slavs in Alps, 131
Colorado
  Agriculture (Robbins), *bibliogr.*, 353
  Geology of Rocky Mountain National Park (Lee), *bibliogr.*, 352
  Plants on abandoned roads (Shantz), *bibliogr.*, 353
Colorado Desert
  Natural history (Murphy), *bibliogr.*, 352
Colorado River
  Colorado River and its utilization (La Rue), *rev.*, 54
  See also Grand Canyon
Colton, H. S., 351
Colton, M. R. F., 351
Columbia Falls, Me., 165
Columbia River
  History, etc. (Lyman), *bibliogr.*, 352
Columbus, N. M., topographic sheet, *map*, 353
Commerce
  Blue-grass region, 1810-20 (Gronert), *bibliogr.*, 423
  California, southern (Rolfe), *bibliogr.*, 190
  Caravan trade of the Sahara (Loft), *bibliogr.*, 193

Commerce (*continued*)
  Columbia River (Lyman), *bibliogr.*, 352
  Dutch and East Indian trade (Scott), *bibliogr.*, 63
  French colonies (Vergnes), *bibliogr.*, 62
  German foreign-trade organization and methods (Snow), *bibliogr.*, 64
  New World, early European struggle for (Davenport), *bibliogr.*, 64
  São Paulo, Brazil (Hoover), *bibliogr.*, 57
  Silk in Asia at beginning of Christian era (Schoff), *bibliogr.*, 195
  South America and the United States, 79
  Turks and Oriental trade routes (Lybyer), *bibliogr.*, 60
  Unifying character, 65
  United States, foreign, 1917, *bibliogr.*, 271
  Verkehrsgeschichte der Alpen, Vols. 1 and 2 (Scheffel), *rev.*, 190
Communes
  Italian (Sbrocca), *bibliogr.*, 193
Como Ridge, Wyo., topographic sheet, *map*, 353
Comodoro Rivadavia
  Petroleum, *note*, 183
Compton, R. H., 358
Congo
  Pioneering in the Congo (Springer), *rev.*, 430
Conifers
  Rocky Mountain (Sudworth), *bibliogr.*, 353
Connecticut
  Forest area, *note*, 51
Conrey, G. W., 189
Constantinople
  Adriatic Slavs and the overland route to (Evans), *bibliogr.*, 275
  Straits and (Newbigin), *bibliogr.*, 276
Continentality and temperature (Brooks), *bibliogr.*, 128
Conway, Sir Martin, 314, 315, 316
Coolidge, A. C., 2
Coolidge, W. A. B., 191
Cooper, C. S., 195
Copacabana, 76
Copiapó, 69, 77
Coral islands and reefs
  Funafuti evidence (Skeats), *bibliogr.*, 359
  Hawaii (MacCaughey), *bibliogr.*, 359
Cornwall
  Early tin trade (Whitley), *bibliogr.*, 426
  River gorges (Dewey), *bibliogr.*, 425
Coronation Gulf
  Eskimo bowmen (ills.), 307
  Eskimos skinning a seal (ill.), 292
Corsica
  Maps, eighteenth century (Brian), *bibliogr.*, 192
Corti, Alfredo, 193
Corti, Hércules, 122
Cosmography, 325, 326, 333
Cosna-Nowitka region, The, Alaska (Eakin), *rev.*, 350
Cossu, Angelo, 193
Costa, D. F. da, 57
Costa Rica
  Year, A, of Costa Rican natural history (Calvert), *rev.*, 423
Côte d'Azur, 147
Cotterill, R. S., 120
Cotton
  Climatology of the plant, *note*, 348
Cotton, C. A., 125
Cowles, H. C., 108
Crandall, Roderic, 57
Crane, V. W.
  The Tennessee River as the road to Carolina: The beginnings of exploration and trade, *rev.*, 119
Crazy Mountains, 404
Creation and the Garden of Eden (Tai), *bibliogr.*, 195
Cresson, B. F., Jr., 272
Croats, 91, 96
Crocker's Station, 383
Cronheim, Paul, 427
Crooke, William
  Personal, 267
Crookes, William
  The wheat problem, *rev.*, 198
Crops
  Climate and, in the United States, *note*, 345
  Growing season in the United States (with map), 343, 344
  Seasonal work (Baker and others), *bibliogr.*, 270
  See also Agriculture; Farmers and farming
Crose, W. M., 358
Cufino, Luigi
  Nel Mar Rosso: Rendiconto di una missione inviata dalla Società Africana d'Italia, April-Luglio, 1913, *rev.*, 59
Cullum medal
  Award to E. de Margerie, *note*, 262
  Award to F. H. Newell, *note*, 111
  Presentation to E. de Margerie at Paris, *note*, 416
Cultivation
  Oasis lands, Baharia, *map*, 278
Culture
  Ethnology and (Lowie), *bibliogr.*, 360
Cutler, Me., topographic sheet, *map*, 272
Cuzco
  Fair, 73
Cvijić, Jovan, 275
Cyclones
  Arabian Sea (Gallé), *bibliogr.*, 127
Cypress, Tex., topographic sheet, *map*, 121
Cyprus. *See under* Mediterranean Sea
Cyrenaica, *note*, 347
Czechoslovakia, 290

D

Dainelli, Giotto, 192
Dal Älf lake system
  Floods (Engström), *bibliogr.*, 428
  Influence of rain and temperature (Wallén), *bibliogr.*, 429
Dale, H. C., 270
Dall, W. H., 351
Daly, R. A., 358

- Daly (Charles P.) medal
  - Award to Stefánsson, *note*, 111
  - Presentation to Stefánsson, *note*, 49
- Danube River, 290
- Danzig, 284, 286
- Dardanelles. *See* Constantinople
- Darley, J. M., 271
- Davenport, F. G., 64
- Davidson, George, 410
- Davidson Range, 410
- Davies, A. M., 195
- Davis, A. P., 199
- Davis, C. A., 162, 165, 167
- Davis, Jerome, *note*, 345
- Davis, W. G., 113
- Davis, W. M., 107, 108, 125, 264
  - Drainage evolution on the Yünnan-Tibet frontier, 413-415
  - Young coasts, The, of Annam and northern Spain, 176-180
- Davison, Charles, 425
- Davity, Pierre
  - Pierre Davity: His "Geography" and its use by Milton (Gilbert), 322-338
- Dawson, T. F., 351
- Day, Clive, 3
- Day, T. E., 125
- Dayton, Ohio, 152
- Dead Sea, 34
- Death Valley, 262 (*note*), 263, 406
- Debenedetti, Salvador, 122
- Deblois, Me., 165
  - Raised bog (ills.), 160, 163
- De Booy. *See* Booy
- Debra-Damo, 335
- De Cristo, Giuseppe, 275
- De Filippi, Filippo, 53, 123
- De Fiore, O., 123
- Deim Zubeir, *map*, 60
- De Land, C. E., 189
- Delaware River
  - Significant dune (Abbott), *bibliogr.*, 272
- Delisle, Joseph Nicolas
  - Isnard, A., on, *bibliogr.*, 200
- Dellenbaugh, F. S., *note*, 264
- Del Zanna, Pietro, 123
- De Magistris, L. F., 123
- Demianof, V. P., 278
- Democracy
  - America and Asiatic citizenship (Gulick), *bibliogr.*, 270
- Denali, Mt., 411
- Denbo Heath, Me., 165
  - Vegetation (ills.), 160, 163
- Denmark
  - Abnormal high water (La Cour), *bibliogr.*, 429
  - Bibliography, 428
  - Biological value of adjoining waters (Gerain), *bibliogr.*, 428
  - Claim on Spitsbergen, 314
  - Slesvig and peace treaty provision, 287
- Denverton, Cal., topographic sheet, *map*, 353
- Deserts
  - As boundaries, 205
  - Egypt, observations (Stromer), *bibliogr.*, 278
- Deserts (*continued*)
  - Establishment of perennials (Shreve), *bibliogr.*, 353
  - Lacustral record of past (Keyes), *bibliogr.*, 352
  - Siwa Oasis, military campaign, *bibliogr.*, 277
  - Western United States, signposting, *note*, 262
- De Stefani, Carlo, 61, 123
- Devon
  - River gorges (Dewey), *bibliogr.*, 425
- Dewey, Henry, 425
- Dickinson, Alfred, 279
- Dictionaries
  - Washington geography (Landes), *bibliogr.*, 352
- Dinaric type, 92
- Dingelstedt, V., 195
- Dingle, E. J., 61
- "Dioneo". *See* Shklovsky, I. W.
- Dionysius Periegetes, 322
- Discovery
  - Australia (Beltrán y Rózpide), *bibliogr.*, 432
  - *See also* Exploration
- Distribution, economic
  - Bibliography, 63, 64
- Distribution, plant. *See* Phytogeography; Plants
- Dixon, Ill., topographic sheet, *map*, 189
- Dixon, R. B., 3
- Dodge, R. E., 50
- Dodwell, G. F., 125
- Dogs
  - Use in the Arctic, 291-292, 297
- Dolphin and Union Strait, 295
- Donner, H. M., *note*, 262
- Douie, James, 279
- Dove Mountain, Tex., topographic sheet, *map*, 423
- Dover, N. H.-Me., topographic sheet, *map*, 272
- Dovey Estuary
  - Salt marshes (Yapp and others), *bibliogr.*, 427
- Drainage
  - Evolution on the Yünnan-Tibet frontier (Davis), 413-415
- Drexel Aerological Station
  - Free-air data, *note*, 182
  - Free-air data (Gregg), *bibliogr.*, 188
- Dry Tortugas
  - Vegetation, *note*, 417
- Dryden Crossing, Tex., topographic sheet, *map*, 121.
- Dryer, C. R., 108.
- Ducloux, E. H., 122
- Duluth
  - Forest fires near, 220
  - Trees uprooted by fire gale (ill.), 230
  - Weather, Oct. 12, 1918 (map), 223
  - Wind, Oct. 11-13, 1918 (diagr.), 224
- Dunbar, G. D., 279
- Dunes
  - Archeological significance of an ancient (Abbott), *bibliogr.*, 272

- Dunes (*continued*)
  - Gascony (Harlé), *bibliogr.*, 274
  - San Francisco, Cal., vegetation (Ramaley), *bibliogr.*, 352
- Dunn, Robert, 411
- Dunnewald, T. J., 189
- Dunoyer, L., 274
- Durham (county)
  - Vegetation (Jeffreys), *bibliogr.*, 426
- Dutch
  - East Indian trade (Scott), *bibliogr.*, 63
  - In Brazil (Lyra), *bibliogr.*, 57
  - Spitsbergen, discovery, etc., 311
- Dvorsky, V., 275
- Dwellings. *See* Houses

E

- Eakin, H. M.
  - The Cosna-Nowitka region, Alaska, *rev.*, 350
- Earth science. *See* Geography
- Earthquakes
  - Caraveli, Peru (Umlauff), *bibliogr.*, 425
  - Ochils (Davison), *bibliogr.*, 425
- East Indies
  - Dutch trade (Scott), *bibliogr.*, 63
- East Prussia
  - Peace treaty territorial provisions, 284, 286
- Eastern Question. *See* Near East
- Eckardt, W. R., 195
- Economic geography
  - Bibliography, 198
  - Investments in Latin America and British West Indies (Halsey), *bibliogr.*, 128
  - Wheat problem, The (Crookes), *rev.*, 198
  - *See also* Distribution
- Economic regions
  - France (Carter; Clerget), *bibliogr.*, 274
- Economics
  - Australia, western (Piccoli), *bibliogr.*, 432
  - British Empire, *bibliogr.*, 58
  - Equilibrium and boundaries, 215
  - Sweden (Frahne), *bibliogr.*, 428
- Ecuador
  - Bibliography, 56, 354
  - Communications (Manrique), *bibliogr.*, 354
  - Descriptive data, *bibliogr.*, 56
- Edale
  - Study (Fawcett), *bibliogr.*, 425
- Eden, Garden of
  - Situation (Tai), *bibliogr.*, 195
- Education in Finland, 374
- Edwards, L., 278
- Egypt
  - Ancient, geographic factors (Rolfe), *bibliogr.*, 193
  - Bibliography, 277-278
  - Bridge to Mesopotamia, 25, 27
  - Magnetic survey (Hurst), *bibliogr.*, 193
  - Military campaign in Jan., 1916, *bibliogr.*, 277
  - Monuments and geography (Schiaparelli), *bibliogr.*, 193
  - Northwest frontier (Cana), *bibliogr.*, 277
- Egypt (*continued*)
  - Observations in the desert (Stromer), *bibliogr.*, 278
  - Public Works, Annual report, 1915-1916, of the Ministry of, *rev.*, 355
  - Spell of (Bell), *bibliogr.*, 277
  - Temperature as related to that of Italy (Eredia), *bibliogr.*, 277
  - Topographical map, various sheets, *map*, 278
- Eichler, J., 427
- El Alfarcito, Argentina
  - Ruins (Debenedetti), *bibliogr.*, 122
- Elbe River, 290
- Elbing, 284
- El Camino Sierra, 386
- Electra, Tex., topographic sheet, *map*, 121
- Eliot, M. E. Y.
  - Tacheometer surveying, with special notes, etc., *rev.*, 62
- Ellendale Aerological Station
  - Free-air data, *note*, 182
  - Free-air data (Gregg), *bibliogr.*, 188
- Elliott, L. E.
  - Brazil today and tomorrow, *rev.*, 57
- Ellsworth, Me., 164
- Elrod, M. J., 352
- Elschner, Carl, 358
- Emerson, Alfred, *note*, 183
- Emerson, B. K., 272
- Emerson, F. V., 120
  - The Southern long-leaf pine belt (with map and ills.), 81-90
- Emigration
  - Alsace-Lorraine (Vidal de la Blache), *bibliogr.*, 428
  - As related to boundary making, 214
  - Finland, 367
  - From Italy into France, 148
  - Italian (Cabrini), *bibliogr.*, 192
- Emmons Peak, 404
- *Endeavour* (ship)
  - Australian Cephalopoda (Berry), *bibliogr.*, 125
- England
  - Coal, search for (Strahan), *bibliogr.*, 426
  - Development, The, of transportation in modern England (Jackman), *rev.*, 58
  - Meteorological theory since 1866 (Shaw), *bibliogr.*, 426
  - Natural divisions (Fawcett), *bibliogr.*, 425
  - Proposed subdivision into provinces (with map), *note*, 114
- English Channel
  - As a boundary, 211
  - Tunnel aspects (Fox), *bibliogr.*, 58
- Engström, E. O., 428
- Equatorial Africa. *See under* Africa
- Equi (Apuan Alps)
  - De Stefani, C., *bibliogr.*, 123
- Eredia, Filippo, 123, 277, 278
- Erosion
  - Helgoland (Anfossi), *bibliogr.*, 427
- Eruptions
  - Katmai (Griggs), *bibliogr.*, 351
  - Kilauea (Wood), *bibliogr.*, 359

Eruptions (*continued*)
  Mauna Loa, 1914 (Wood), *bibliogr.*, 359
  Vesuvius in 1913 (De Fiore), *bibliogr.*, 123
Eskimos
  Bowmen at Coronation Gulf (ills.), 307
  Camps (ills.), 294, 295
  Methods of hunting and fishing, 291
  Skinning a seal (ill.), 292
  Woman and girls fishing (ill.), 295
  Woman fishing (ills.), 302, 303
  See also Arctic; Greenland
Esthwaite Water
  Vegetation (Pearsall), *bibliogr.*, 426
Ethnobotany
  Tewa Indians (Robbins and others), *bibliogr.*, 190
Ethnography
  Ethnography, The, of the Yugo-Slavs (Stanoyevich), 91-97
  Finns (with map), 361, 364
  Italy, northern frontier zone (map), opp. 144
  Macedonia (De Cristo), *bibliogr.*, 275
  Mexican bureau created, *note*, 267
  Northern Italy, 129
  Progress and status (Weisgerber), *bibliogr.*, 360
  Queensland (Hamlyn-Harris), *bibliogr.*, 61
  Yugo-Slavs (Cvijić; Gallois; Musoni), *bibliogr.*, 275
Ethnology
  Bibliography, 360
  Chinese origins, *note*, 51
  Culture and (Lowie), *bibliogr.*, 360
  Hawaiians (Fornander and Thrum), *bibliogr.*, 358
  Italian people (Giuffrida-Ruggeri), *bibliogr.*, 123
  Uganda expedition, *note*, 347
  See also Anthropology
Eupen, 282
Eurasia
  Continentality and temperature (Brooks), *bibliogr.*, 128
  Sketch map showing position of Palestine in relation to routes, 26
Europe
  History of physical boundaries in, 208
  Reconstruction, The, of South-Eastern Europe (Savić), *rev.*, 274
  See also Alsace-Lorraine; War, the
Eustathius (Lulofs), *bibliogr.*, 200
Evans, Arthur, 275
Everest, Mt., 151, 154, 158
Expeditions
  Arctic by airplane, proposed, *note*, 186
  Aurora-borealis, 1913, to Bossekop (Störmer), *bibliogr.*, 429
  Michael Sars in the North Atlantic (Gravier), *bibliogr.*, 127
  Uganda, *note*, 347
Exploration
  Alaska mountains (Brooks), *bibliogr.*, 351
  Ashley-Smith expeditions (Dale), *bibliogr.*, 270
  Australia, Captain White's work (Shufeldt), *bibliogr.*, 432
Exploration (*continued*)
  Australia, central (Day), *bibliogr.*, 125
  Australia, northwestern (Basedow), *bibliogr.*, 125
  High-altitude flying in relation to exploration (with diagrs. and ills.) (Woodhouse), 149-158
  "Living off the country" as a method of Arctic exploration (with ills.) (Stefánsson), 291-310
  Spitsbergen, 315
  Tennessee River, The, as the road to Carolina: The beginnings of exploration and trade (Crane), *rev.*, 119
  See also History of geography and exploration

F

Fairchild, H. L., 272
Fairs
  Annual, 74
  Fairs of the Central Andes (with map and ills.) (Wrigley), 65-80
  Mexican versus Peruvian, 73
  Various, 65
  Weekly, 70
Falkland Islands
  Bird photographing (Beck), *bibliogr.*, 122
  In 1765, *bibliogr.*, 122
Far East
  Weather (Okada), *bibliogr.*, 195
  See also Orient
Farabee, W. C., 3
Farm animals. *See* Live stock
Farmers and farming
  South, mixed farming, 89
  Southwest, migratory (Leonard), *bibliogr.*, 120
  See also Agriculture
Farms. *See* Agriculture
Farrow, E. P., 425
Farther India
  Bibliography, 357, 358
Fassig, O. L., 107
Fauna
  Australian subregions (Sloane), *bibliogr.*, 432
  See also Animals
Fawcett, C. B., 114 (*note*), 425, 426
Fay, S. P., 407
Fearnsides, W. G., 199
Felicity, Ohio, topographic sheet, *map*, 189
Fell, E. N.
  Russian and nomad: Tales of the Kirghiz Steppes, *rev.*, 430
Fella valley, 139
Fell-fields
  Alpine fell-fields of eastern North America (with maps and ills.) (Harshberger), 233-255
Fels, Edwin, 427
Fenneman, N. M.
  The circumference of geography (with diagr.), 168-175
Fernández, Juan, 432

Festivals
  Pagan and Christian, 76
  Peru, ancient, 74
Fewkes, J. W., 190, 352
Figs
  Culture in southwestern United States (Rixford), *bibliogr.,* 352
Finale (Italian Riviera)
  Andriani, G., *bibliogr.,* 192
Finch, V. C., 345
Finland
  Agriculture, 368
  Bibliography, 428
  Communications, 371, 374
  Education, 374
  Emigration, 367
  Ethnography (with map), 361, 364
  Forests and falls, 370
  Finland: The land and the people (with maps and ills.) (Nordenskiöld), 361-376
  Lake Plateau, 371
  Lake Plateau scenes (ills.), 372, 373
  Population and distribution, *bibliogr.,* 428
  Population density (with map), 365, 366
  Settlement, 362
  Water power, 371, 373
Fires. *See* Forest fires
Fish
  Arctic resources, 296
  As diet in the Arctic, 293
  Eskimo camp, drying (ill.), 295
  See also Cephalopoda
Fish, C. R., 360
Fisher, L. C., 352
Fishing
  Eskimo woman (ills.), 302, 303
  Eskimo woman and girls (ill.), 295
Fiume, 136
Flensburg, 288
Fletcher, C. B.
  The new Pacific; British policy and German aims, *rev.,* 124
Fleure, H. J., 427
Flockart, D. P., 61
Floods
  China, relation to forests, *note,* 348
  Dal Älf-lake system (Engström), *bibliogr.,* 428
Flora
  Flora in the vicinity of New York (Taylor), *rev.,* 271
  Galápagos Islands (Kroeber), *bibliogr.,* 56
  Libya, economic (Trotter), *bibliogr.,* 278
  Palmyra Island (Rock and others), *bibliogr.,* 359
  See also Phytogeography; Plants
Flores, Teodoro, 424
Flowing wells. *See* Wells
Flying. *See* Aviation
Fog
  Montevideo, *note,* 114
  Transatlantic aviation and, *note,* 420
Folklore
  Finland, 375
Foncin, Pierre, 115
Food
  Arctic, 291
Food (*continued*)
  Caches, Baillie Island (ill.), 294
  Exclusive fish and meat diet, 293
  Liberia, kind and cost, 399
  World's supply (Roorbach), *bibliogr.,* 199
Foraker, Mt., 411
Forecasts
  Ocean weather, for aviators, *note,* 421
  Sweden, water level (Wallén), *bibliogr.,* 429
Forest fires
  Northeastern Minnesota forest fires, The, of Oct. 12, 1918 (with maps, diagr., and ills.) (Richardson), 220-232
  Smoke from Minnesota, *note,* 264
Forestry
  Hawaii (Judd), *bibliogr.,* 359
  New Zealand (Schlich), *bibliogr.,* 432
Forests
  Afforestation in Britain (Stirling-Maxwell), *bibliogr.,* 426
  China, relation to floods, *note,* 348
  Finland, 370
  France, effects of the war (Graves), *bibliogr.,* 274
  New England, changes since 1620 (with diagr.), *note,* 50
  Rocky Mountain conifers (Sudworth), *bibliogr.,* 353
  Southern long-leaf pine belt, The (with map and ills.) (Emerson), 81-90
  Texas, The spread of timbered areas in central (Foster), *rev.,* 119
Forfarshire
  Regional study (Hosgood), *bibliogr.,* 426
Fornander, Abraham, 358
Fort Recovery, Ohio, topographic sheet, *map,* 189
Forth Estuary
  Industrial possibilities (Cadell), *bibliogr.,* 355
Fossils
  Bolivian plants (Berry), *rev.,* 353
Foster, J. H.
  The spread of timbered areas in central Texas, *rev.,* 119
Fourèsts in Alpine valleys, *note,* 265-266
Fournier, E., 274
Fox, Francis, 58
Foxes. *See* Arctic foxes
Foye, W. G., 424
Frahne, Carl, 428
France
  Alps. *See under* Alps
  Area seen from an airplane (ill.), 157
  Bas-Maine, Le: Étude géographique (Musset), *rev.,* 272
  Bibliography, 273-274
  Boundary problem, 216
  Canals and navigable rivers (Barrecchia), *map,* 274
  Cities (Lyons, Marseilles, Nice) of the southeast (Blanchard), *bibliogr.,* 273
  Contribution to geology (Margerie), *bibliogr.,* 200
  Forests as affected by the war (Graves), *bibliogr.,* 274

France (*continued*)
  Italians in, 147, 148
  Proposed regional subdivisions (with maps), 114, 115, 116
  Railways across the Pyrenees proposed, *note*, 346
  Regional divisions (Carter; Clerget), *bibliogr.*, 274
  See also War, the
Franco-Italian contact zone, 146
Franklin, Me., 164
Franklin, Sir John, 291
Frazer, Sir J. G., *note*, 347
Freedom of the seas
  Grotius's dissertation (Scott), *bibliogr.*, 63
Freeman, O. W., 190
Freire-Marreco, Barbara, 190
French colonies
  Commerce (Vergnes), *bibliogr.*, 62
French Equatorial Africa, *map*, 60
French language in Italy, 146
Freshfield, D. W., 191
Friederichsen, Max, 357
Frisians, 288
Friuli
  Economic value (Sallior), *bibliogr.*, 124
  Rivers of the Friuli type (Gortani), *bibliogr.*, 123
Frontier
  Marches of the dragoons in the Mississippi Valley (Pelzer), *bibliogr.*, 271
  World problem (Fish), *bibliogr.*, 360
Frontiers. *See* Boundaries
Frost
  Autumn, first killing, in the United States (with map), 342, 343
  Frost in the United States (with maps) (Ward), 339-344
  Nature and occurrence, 340
  Spring, last killing, in the United States (with map), 341
Funafuti
  Borings, evidence as to coral-reef problem (Skeats), *bibliogr.*, 359
Fur
  Trappers in Spitsbergen, 314

G

Gagnieur, W. F., 188
Gagnon, Alphonse, 272
Gait, E. A.
  Census of India, 1911, *rev.*, 196
Galápagos Islands
  Floral relations (Kroeber), *bibliogr.*, 56
Galindo y Villa, Jésus, 118
Gallé, P. H., 127
Gallo, Joaquín, 424
Gallois, L., 200, 275
Galloway, J. J., 187
  Personal, 267
Gangetic Plain (Davies), *bibliogr.*, 195
Gannett, S. S., 63
Gannett Peak, 404
Ganong, W. F., 161, 162, 166
Gantts Quarry, Ala., topographic sheet, *map*, 120
García y Alva, Federico, 424
Garder, Lake
  Kunisch, Erwin, *bibliogr.*, 428
Gargáno, Monte, *bibliogr.*, 192
Gasca, Pedro de la
  Unpublished letters (Saville), *bibliogr.*, 425
Gascony
  Dunes (Harlé), *bibliogr.*, 274
Gastaldi, Giacomo
  Marinelli, O., on, *bibliogr.*, 200
Gebel River
  Climatology (Eredia), *bibliogr.*, 277
Geerinckx, J., *note*, 421
Geib, W. J., 189
Genoa
  Map of the region, eighteenth century (Brian), *bibliogr.*, 192
Genocchi, Giovanni, 60
Geodesy
  Astronomical observations (Brown), *bibliogr.*, 63
  Bibliography, 63
  Gravity and isostasy (Bowie), *bibliogr.*, 63
  See also Surveying
Geographers. *See* Association of American Geographers
Geographical news, 53, 118, 187, 266, 421
Geographical Review, 110
Geographical societies. *See* American Geographical Society; Mexican Geographical Society; Royal Geographical Society; Royal Scottish Geographical Society
Géographie Bong. *See* Reclus, Onésime
Geography
  American colleges (Norton), *bibliogr.*, 271
  Ancient (Lulofs), *bibliogr.*, 200
  At the meeting of Società Italiana per il Progresso delle Scienze (April, 1917) (Ricchieri), *bibliogr.*, 200
  Circumference, The, of geography (with diagr.) (Fenneman), 168-175
  College study, 39
  Diagram of relation to other sciences, 168
  Generalizations (Chisholm), *bibliogr.*, 280
  Geography in America (Atwood), 36-43
  Half century of progress (Keltie), *bibliogr.*, 200
  Instruction in Italy (Ricchieri), *bibliogr.*, 193
  Military significance (Mackie), *bibliogr.*, 64
  Need for extension of study, 39
  Value in the war, 37
  See also History of geography and exploration
Geography Teachers. *See* National Council of Geography Teachers
Geology and geomorphology
  Aosta, Valley of (Novarese), *bibliogr.*, 124
  Camp Bowie (Shuler), *bibliogr.*, 120
  Camp Funston (Moore), *bibliogr.*, 189

Geology and geomorphology (*continued*)
  Camp Grant, The environment of (Salisbury and Barrows), *rev.*, 188
  "Dry" lakes in western Australia (Jutson), *bibliogr.*, 126
  English Lake District (Marr), *bibliogr.*, 426
  France's contribution (Margerie), *bibliogr.*, 200
  Graphite deposits of the Adirondacks (Alling), *bibliogr.*, 272
  Himalaya and Gangetic Plain (Davies), *bibliogr.*, 195
  Honduras, rock collection (Foye), *bibliogr.*, 424
  Kalgoorlie, Australia, country south of (Honman), *bibliogr.*, 125
  McKay, Alexander, and his work in New Zealand (Thomson), *bibliogr.*, 200
  Massachusetts and Rhode Island (Emerson), *bibliogr.*, 272
  Mississippi: Its geology, geography, soils, and mineral resources (Lowe), *rev.*, 422
  Montana (Collier), *bibliogr.*, 351
  Musgrave Ranges, region south of, and Great Australian Artesian Basin (Jack), *bibliogr.*, 126
  New Caledonia (Piroutet), *bibliogr.*, 359
  New South Wales (Benson), *bibliogr.*, 125
  Oklahoma (Heald; Trout and Myers; Wallis), *bibliogr.*, 120
  Papers in Centennial Number of *Amer. Journ. of Sci.*, *note*, 421
  Queensland, flowing wells (Gregory), *bibliogr.*, 61
  Rhode Island (Emerson), *bibliogr.*, 272
  Rocky Mountain National Park (Lee), *bibliogr.*, 352
  Sinai, west-central (Ball), *map*, 278
  Terms, 173
  Texas (Udden and others), *bibliogr.*, 120
  Tonkin (Sion), *bibliogr.*, 358
  Uruguay, bibliography (Marstrander), *bibliogr.*, 123
  Wellington (province), N. Z. (Cotton), *bibliogr.*, 125
  Wyoming, bibliography (Bovee), *bibliogr.*, 55
Geomorphology. *See* Geology and geomorphology
George Washington (ship), 2, 3
Gerain, Louis, 428
Germans
  Alpine colonization, 131
Germany
  Alsace and Lorraine, The question of (Balch), *rev.*, 427
  Areas affected by peace treaty provisions, 288
  Armament in the Iron Age (Jahn), *bibliogr.*, 427
  Bibliography, 427, 428
  Cartels (Cronheim), *bibliogr.*, 427
  Census, summary, *bibliogr.*, 428
  Foreign-trade organization and methods (Snow), *bibliogr.*, 64
Germany (*continued*)
  Map showing new boundaries as provided by the peace treaty, opp. 288
  New boundaries of, The, according to the peace treaty (with map), 281-290
  Proposed subdivisions (with map), *note*, 116, 117
  Rainfall (Hellmann), *bibliogr.*, 427
  Russia, Germany, and Asia, *bibliogr.*, 62
  Snowfall in North (Lachmann), *bibliogr.*, 428
  See also Alsace-Lorraine
Ghàdames
  Climate (Eredia), *bibliogr.*, 278
Giandotti, M., 123
Giannitrapani, Luigi, 59
Gibbs, L. S., 358
Gibraltar. *See under* Mediterranean Sea
Gilbert, A. H.
  Pierre Davity: His "Geography" and its use by Milton, 322-338
Gilbert, G. K., 108, 171, 264
Gilbert Peak, 404
Giuffrida-Ruggeri, V., 123, 275
Glaciation
  Balkan Peninsula (Cvijić), *bibliogr.*, 275
  New Zealand (Park), *bibliogr.*, 432
  White Mountains of New Hampshire (Goldthwait; Johnson), *bibliogr.*, 272
Glacier National Park (Elrod), *bibliogr.*, 352
Glaciers
  Maritime Alps (Roccati; Sacco), *bibliogr.*, 191
Glaciology
  Aosta, Valley of (Novarese), *bibliogr.*, 124
Glenora Peak, 409
Godinho, Victor, 57
Golder, F. A., 128, 351
Goldthwait, J. W., 272
Good Hope, Ill., topographic sheet, *map*, 189
Goode, J. P., 262 (*note*), 269
Gorceix, Charles, 274
Gordon, G. B.
  In the Alaskan wilderness, *rev.*, 350
Gorges
  Cornwall and Devon (Dewey), *bibliogr.*, 425
Gorizia, 137
Gorodkov, B., 278
Gortani, Michele, 123
Gottfried, J. L., 324
Gradmann, R., 427
Graham, Stephen
  Through Russian Central Asia, *rev.*, 357
Grand Canyon
  First traversing (Dawson), *bibliogr.*, 351
  Memorial to Major Powell, *note*, 264
Granite Peak, Mont., 404
Graphite
  Adirondack deposits (Alling), *bibliogr.*, 272
Graves, H. S., 274
Gravier, Ch., 127
Gravity
  Investigations (Bowie), *bibliogr.*, 63

Great Britain
  Bacon's commercial map, *map*, 427
  Economic empire, *bibliogr.*, 58
  Holidays on inland waterways (Bonthron), *bibliogr.*, 355
  Oversea enterprise (Lucas), *bibliogr.*, 58
  Wool, command of, *bibliogr.*, 426
  See also British Isles
Great Lakes
  Rain, 45, 46, 47
Great Sierra Silver Mining Co., 379
Great Southern Lumber Co., 85
Great Sydney Bog, 164, 166
Greaves, J. E., 352
Greely, A. W., 46
Greenland
  Fell-fields, 234
  Name applied to Spitsbergen, 312
Greenough, John, 49, 111, 181, 262, 345
Gregg, W. R., 182, 188, 270, 419 (*note*)
Gregory, H. E., 108
Gregory, J. W., 61, 347 (*note*)
Grenfell, W. T., 403
Grice, J. W., 128
Grieve, Mackenzie, *note*, 420
Grieves, L. C., 63
Griggs, R. F., 351
Grimstone, Edward, 323, 333, 338
Grisons, 144, 145
Gronert, T. G., 423
Grönwall, K. A., 428
Grosina, Val (Corti and Laeng), *bibliogr.*, 193
Groslier, George, 357
Grotius, Hugo
  On freedom of the seas (Scott), *bibliogr.*, 63
Grover, N. C., 54
Grumant, 312
Guerra, J. G., 122
Guidebooks
  Argentina, etc. (Martínez), *bibliogr.*, 123
  Guide, The, to South and East Africa, for the use of tourists, sportsmen, invalids, and settlers: 1916 edit. (Brown), *rev.*, 59
  Rio de Janeiro, Bay of (Lacerda), *bibliogr.*, 57
  Switzerland (Tschudi), *bibliogr.*, 191
Gulf Coast. *See* Mexico, Gulf of
Gulf Stream
  North Atlantic Drift and (Loft), *bibliogr.*, 127
Gulick, S. L., 270
Gunfire
  Rainfall effect in British Isles, *note*, 51

H

Hachita, N. M., topographic sheet, *map*, 353
Hafsbotn, 312
Hagar, Stansbury, 360
Hainsworth, R. G., 270, 345
Hakkiari, Mesopotamia (Wigram), *bibliogr.*, 61
Hakluyt, Richard
  As pioneer of colonization (Watson), *bibliogr.*, 200
  Principle of original sources, 333
Hall, A. D., 58
Hall, C. F., 291
Hallenbeck, Cleve, 352
Hallock, W., 417
Halsey, F. M., 128
Hamlyn-Harris, R., 61
Hamrick, A. M., 419
Han River, *note*, 185, 186
Hanbury, David, 293
Hanchungfu, *note*, 185, 186
Hanging valleys
  Yünnan-Tibet frontier, 414
Hangö
  View seaward from coast near (ill.), 367
Harbors. *See* Ports
Hardtner family, 85
Harlé, Edouard, 274
Harmattan
  African West Coast, 394
Harper, R. M., 50, 108
Harrington, J. P., 190
Harrington, M. W., 46, 263
Harrison, C. W., 357
Harshberger, J. W.
  Alpine fell-fields of eastern North America (with maps and ills.), 233-255
Hart, A. B., 112
Haskins, C. H., 3
Hauser, Henri, 191
Haute-Savoie
  Valleys (Gorceix), *bibliogr.*, 274
Hawaii
  Climate and white residents, *note*, 418
  Coral reef survey (MacCaughey), *bibliogr.*, 359
  Kilauea district, model (Daly), *bibliogr.*, 358
  Tectonic lines (Powers), *bibliogr.*, 359
  Volcano study results (Jaggar), *bibliogr.*, 359
Hawaiians
  Native account of origin of race (Fornander and Thrum), *bibliogr.*, 358
Hawker, H. G., *note*, 420
Hawley, A. R., 158
Heald, K. C., 120
Heart Butte, Mont., topographic sheet, *map*, 190
Heat. *See* Temperature
Heath, 160 (ill.), 163 (ill.), 165, 167
Helgoland
  Erosion (Anfossi), *bibliogr.*, 427
Hellmann, G., 427
Helsingfors, University of, 375
Hennessy, Jean, 115
Henriques, Cárlos, 122
Henry, A. J., 107, 270
Herbertson, A. J., and O. J. R. Howarth, edits.
  Oxford survey of the British Empire, The: Asia, etc., *rev.*, 193

Herbertson and Howarth, edits. *(continued)*
  Oxford survey of the British Empire, The: (1) General survey; (2) British Isles and Mediterranean possessions, *rev.*, 61
Hermanas, N. M., topographic sheet, *map*, 353
Hertsegovinians, 94
Hesse
  Forests and finance, *bibliogr.*, 428
  Hessian Ried (Schenk), *bibliogr.*, 428
Heylyn, Peter, 325
Highfield Anchorage, Alaska, *map*, 351
Highways. *See* Roads
Hildebrandsson, H. H., 429
Himalaya
  Identification of peaks (Hinks), *bibliogr.*, 195
  Possibility of ascending (Kellas), *bibliogr.*, 195
  Problem of flying across, 149
  Structure (Davies), *bibliogr.*, 195
Hinganfu, *note*, 185, 186
Hinks, A. R., 195
Hirst, C. T., 352
History
  Australia, A short history of (Scott), *rev.*, 125
  Brazil and the Dutch (Lyra), *bibliogr.*, 57
  Geography of history (Brunhes), *bibliogr.*, 64
  Kentucky, pioneer (Cotterill), *bibliogr.*, 120
  New York State Chamber of Commerce (Bishop), *bibliogr.*, 272
  Palestine (Genocchi), *bibliogr.*, 60
  Processes (Teggart), *bibliogr.*, 360
  Rio Grande valley (Pierce), *bibliogr.*, 120
  See also Prehistory
History of geography and exploration
  Bibliography, 64, 200
  Davity, Pierre: His "Geography" and its use by Milton (Gilbert), 322-338
  Historical sketch of Governor William Carr Lane, together with diary, etc. (Twitchell), *rev.*, 190
  Mercator, Gerhard, und die Geographen unter seinen Nachkommen (Averdunk and Müller-Reinhard), *rev.*, 199
  My reminiscences (Pumpelly), *rev.*, 64
  Verendrye family (Robinson and others), *bibliogr.*, 189
  Verkehrsgeschichte der Alpen, Vols. 1 and 2 (Scheffel), *rev.*, 190
Hittite language, 360
Hodge, F. W., *note*, 345
Hoffman, F. L., 280
Hohenzollern
  Vegetation study (Eichler and others), *bibliogr.*, 427
Holdich, T. H., 56
  Theory of boundaries, 203, 217
Holstein
  Hydrography (Breckwoldt), *bibliogr.*, 427
Holy Land. *See* Palestine
Homburg, 283
Honduras
  Notes on rocks (Foye), *bibliogr.*, 424
Honker Bay, Cal., topographic sheet, *map* 353
Honman, C. S., 125
Honolulu
  Rainfall, *note*, 419
Hood Spring, Tex., topographic sheet, *map* 121
Hoover, C. L., 57
Horn, Cape
  Bird quest (Beck), *bibliogr.*, 122
Hornbeck, S. K., 3
Hornell, N. Y., topographic sheet, *map*, 272
Hornemann, Federigo, 278
Horwill, H. W., 271
Horwitz, M. L., 191
Hosgood, Blanche, 426
House, E. M., 2
Houses
  Arizona ruins (Colton), *bibliogr.*, 351
  Fourèsts in Alpine valleys, *note*, 265-266
  Liberia, 393
  Liberia, Americo-Liberian (ills.), 398, 399
  Liberia, native (ill.), 397
  Yugo-Slavs (Dvorsky), *bibliogr.*, 275
Hovey, E. O., 108
Howarth, O. J. R. *See* Herbertson, A. J. and O. J. R. Howarth
Howe, M. A., 359
Hrdlička, Aleš
  Personal, 267
Hrozny, Friedrich, 360
Huancayo
  Fair, 70
  Panoramic view (ill.), 68
  Sunday fair (ill.), 72
Huari
  Fair, 69, 79
Huaylas, Peru
  Coal (Léon), *bibliogr.*, 57
Hucks, B. C., 420
Hudson, Henry
  In Spitsbergen waters, 312
Hudson River
  Upper valley, postglacial features (Fairchild), *bibliogr.*, 272
Human geography
  Bibliography, 280
  Generalizations (Chisholm), *bibliogr.*, 28
  See also Anthropogeography; Anthropology; Ethnology
Humidity
  Liberia, 395
Humphrey, S. K., 360
Hunt, H. A.
  Results of rainfall observations made in South Australia and the Northern Territory, etc., *rev.*, 432
Hunting
  Arctic, 291
  Caribou, 310
  Economy of ammunition, 308
  Musk oxen, 310
  Polar bears, 304
  Seals in the Arctic, methods, 300
Huntington, Ellsworth, 263
  Future of Palestine, The (with map), 24 35

Hurst, H. E., 193
Hurt, L. A., 388
Hutchinson, J. L., 406
Hyderabad
  Artificial reservoirs (map), 279
Hyderabad and Central Provinces topographic sheet 56 N, *map*, 279
Hydro-electric power. *See* Water power
Hydrography
  Po basin (Stella), *bibliogr.*, 124
  Slesvig-Holstein (Breckwoldt), *bibliogr.*, 427
  Yünnan-Tibet frontier, 413
Hygiene, tropical, 400
Hyndman Peak, 404

I

Iberian Peninsula. *See* Portugal; Spain
Ice
  Mackenzie River action, *note*, 346
  See also Arctic
Iceland
  Fell-fields, 234, 237
Idaho
  Outline base map (*map*), 353
  Paradise Valley topographic sheet, *map*, 190
Idaho-Utah
  Preston topographic sheet, *map*, 353
Illinois
  Altenburg, Dixon, Good Hope, La Harpe, Morris, and Vermont topographic sheets, *maps*, 189
  Environment of Camp Grant, The (Salisbury and Barrows), *rev.*, 188
Imatra Fall, 371
  View (ill.), 373
Immigration
  Argentine, L'immigration européenne en (Berne), *rev.*, 121
Incas
  Culture (Bingham), *bibliogr.*, 56
  Markets, 73
India
  Artificial reservoirs (map), 279
  Bibliography, 279-280
  British Empire and, 24
  Census of India, 1911 (Gait), *rev.*, 196
  Oxford survey of the British Empire, The: Asia, etc. (Herbertson and Howarth), *rev.*, 193
  Palestine as key to route to, 27
  Population, *note*, 52, 53
  Route to, 24
  Sea route to (Citati), *bibliogr.*, 195
  Topographic sheets 56 O, 56 N, 78 G, 78 H, 78 J, *maps*, 279, 280
  Water power (Dickinson), *bibliogr.*, 279
Indian Wells, Tex., topographic sheet, *map*, 121
Indiana-Ohio
  College Corner topographic sheet, *map*, 189
Indians
  Bolivian, *note*, 112
Indians (*continued*)
  Bolivian (Nordenskiöld), *bibliogr.*, 425
  Choctaws (Swanton), *bibliogr.*, 120
  Tewa (Robbins and others), *bibliogr.*, 190
Indo-China
  Rainfall (Le Cadet), *bibliogr.*, 358
Industry
  Localization (Keir), *bibliogr.*, 271
  Montana (Freeman), *bibliogr.*, 190
Inglis, H. R. G., 266, 426
Inland waterways
  Finland (ill.), 372
  Great Britain, holidays on (Bonthron), *bibliogr.*, 355
  Sweden (Wallén), *bibliogr.*, 429
"Inquiry," 1
  American Geographical Society and, *note*, 110
Insolation in Liberia, 389
Inti, Argentina
  Hot Springs (Ducloux), *bibliogr.*, 122
Inyo Mountains, 406
Ionia, Mich., topographic sheet, *map*, 189
Iowa Park, Tex., topographic sheet, *map*, 121
Ipswich, Eng., 153
Iquitos
  Bayless, S. E., *bibliogr.*, 56
Iron
  Meteoric iron, use by primitive man (Zimmer), *bibliogr.*, 280
  Shortage of non-phosphoric ore (Fearnsides), *bibliogr.*, 199
Irrigation
  Australian scheme, *bibliogr.*, 125
  Peru (Sutton), *bibliogr.*, 425
  United States (Teele), *bibliogr.*, 271
  United States government works (Davis), *bibliogr.*, 199
  Utah, composition of waters (Greaves and Hirst), *bibliogr.*, 352
Isère River
  Upper valleys (Blanchard), *bibliogr.*, 273
Islam. *See* Mohammedism; Turkey in Asia
Islands
  Atlantic, mythical (Babcock), *bibliogr.*, 126
  Certain pre-Columbian notices of the inhabitants of the Atlantic islands (Babcock), *rev.*, 126
  Island, The, of the Seven Cities (with maps) (Babcock), 98-106
  Italian, orography (Anfossi), *bibliogr.*, 192
  Lacustrine in Italy (Anfossi), *bibliogr.*, 192
  Pacific, present state (Thurn), *bibliogr.*, 359
  Pacific islands of the United States (Biddle), *bibliogr.*, 358
Isle of Pines. *See* Pines, Isle of
Isnard, Albert, 200
Isostasy
  Investigations (Bowie), *bibliogr.*, 63
Istria, 133

Italian African Society. *See* Società Africana d'Italia
Italian front. *See under* War, the
Italians
  Emigration (Cabrini), *bibliogr.*, 192
  Ethnology (Giuffrida-Ruggeri), *bibliogr.*, 123
  In France, 147, 148
  Settlers in São Paulo, Brazil (Capra), *bibliogr.*, 57
Italy
  Adriatic question (Baratta and others), *bibliogr.*, 192
  Bibliography, 123-124, 192
  Cartography (De Magistris), *bibliogr.*, 123
  Climate (Eredia), *bibliogr.*, 123
  French-speaking people, 146
  Map of ethnography of northern frontier, opp. 144
  Mountain dwellers (Arbos), *bibliogr.*, 192
  Political geography (Del Zanna), *bibliogr.*, 123
  Regions of mixed populations, The, in northern Italy (with map) (Marinelli), 129-148
  Weather controls in war zone (Ward), *bibliogr.*, 124

J

Jack, R. L., 126
Jackman, W. T.
  Development, The, of transportation in modern England, *rev.*, 58
Jaggar, T. A., 359
Jahn, Martin, 427
Jakl, V. E., 182, 188
James, G. W.
  Reclaiming the arid West: The story of the United States Reclamation Service, *rev.*, 54
Japan
  Machatschek, F., *bibliogr.*, 195
Japanese
  Problem in the United States (Millis), *bibliogr.*, 352
Jastrow, Morris, Jr.
  War, The, and the Bagdad Railway: The story of Asia Minor and its relation to the present conflict, *rev.*, 60, 360
Jauja
  Sunday fair (ill.), 75
Jefferson, Mark, 3, 110 (*note*), 113, 416
Jeffreys, Harold, 426
Jen River, *note*, 186
Jenkins, E. E., 271
Jobe, Mary L., 407
Jof, 27
Johns, D., 427
Johns Hopkins University, 107
Johnson, D. W., 3, 110 (*note*), 189, 272, 416 (*note*), 417
  Brief report of lecture of Dec. 10, *note*, 49
Johnston, Harry
  Personal, 267
Jones, O. T., 427
Jones, R. W., 407
Jónsson, Helgi, 251, 254
Jordan Gap, Tex., topographic sheet, *map*, 121
Jordan River, 30, 31
  Valley and lakes (Masterman), *bibliogr.*, 61
Journal of Geography
  Assumption of publication by the Amer. Geogr. Soc., *note*, 50
  Transfer of publication, *note*, 110
Journals. *See* History of geography and exploration
Juan de Fuca, Strait of
  Approaches to, Destruction Island to Amphitrite Point, *map*, 353
Judd, C. S., 359
Jugo-Slavs. *See* Yugo-Slavs
Julian Venetia. *See* Venezia Giulia
Juneau, *map*, 351
Jura Mountains
  Chambard, C., *bibliogr.*, 274
Jutson, J. T., 126

K

Kalevala, 375
Kalgoorlie
  Geology of the country south of (Honman), *bibliogr.*, 125
Kallavesi, Lake (ill.), 372
Kandal Residency
  Monograph, *bibliogr.*, 357
Kangchenjhau, Mt., 151, 154, 158
Kantor, M., 122
Kaoliang, 19
Karelia, Russian, 376
Karluk (ship), 297
Karst, 133
  Italian regions (Marinelli), *bibliogr*, 123
Kashmir
  Description (Douie), *bibliogr.*, 279
Katahdin, Mt.
  Fell-field, 241
Katmai, Mt.
  Eruption (Griggs), *bibliogr.*, 351
  Field work near (Griggs), *bibliogr.*, 351
Kearny, T. H., and others
  Indicator significance of vegetation in Tooele Valley, Utah, *rev.*, 189
Keen, Dora, 411
Kehl, 282
Keir, Malcolm, 271
Kellas, A. M., 149, 151, 195
Kellogg, R. S., 51
Keltie, J. S., 200
Kentucky
  Geological map, *map*, 120
  Pioneer history (Cotterill), *bibliogr.*, 120
  Williamson topographic sheet, *map*, 120
Kentucky River
  Navigation (Verhoeff), *bibliogr.*, 120
Kentucky-West Virginia
  Williamson topographic sheet, *map*, 120
Kerby, Ore., topographic sheet, *map*, 353

- Keyes, C. R., 352
- Kiel
  - Atmospheric conditions (Müns), *bibliogr.*, 428
- Kilauea
  - Eruption variations (Wood), *bibliogr.*, 359
  - Model (Daly), *bibliogr.*, 358
- Kindle, E. M., 346
- King William Island, 291
- King's Peak, 404
- Kirghiz Steppes
  - Russian and nomad: Tales of the Kirghiz Steppes (Fell), *rev.*, 430
- Kissel, F. T. M., 126
- Knoche, Walter, 122
- Koati, Island of
  - Bandelier, A. F., *bibliogr.*, 56
- Komorowicz, Maurice von, 432
- Kompong-Chhnang
  - Monograph (Parent), *bibliogr.*, 358
- Kranz, W., 123
- Kroeber, A. L., 56
- Kruuse, Chr., 234
- Kühn, Franz, 123
- Kunisch, Erwin, 428
- Kuopio, 372
- Kuskokwim. *See* Lake Clark-Central Kuskokwim

L

- Labrador
  - Torngats, 403
- Lacerda, Joaquim, 57
- Lachmann, G., 428
- La Cour, D., 429
- Ladins, 130, 132, 139
  - Germanization, 140
- Laeng, Gualtiero (Walther), 123, 193
- La Gasca. *See* Gasca
- La Harpe, Ill., topographic sheet, *map*, 189
- Lahontan, Lake
  - Paleontological evidence of age (Merriam), *bibliogr.*, 352
- Lake Clark-Central Kuskokwim region, The, Alaska (Smith), *rev.*, 350
- Lakes
  - Apennines (Anfossi), *bibliogr.*, 192
  - Apennines, evaporation (Anfossi), *bibliogr.*, 192
  - Bavaria (Fels), *bibliogr.*, 427
  - Desert, past records (Keyes), *bibliogr.*, 352
  - "Dry" lakes in Western Australia (Jutson), *bibliogr.*, 126
  - Finland, 371, 374
  - Jordan River valley (Masterman), *bibliogr.*, 61
  - Pomerania, coastal (Kunisch), *bibliogr.*, 428
  - Ruitor glacier (Preller), *bibliogr.*, 124
  - Sweden, effect of drought of 1914, *bibliogr.*, 429
- Lambart, H. F. J., 412
- Lamoree, J. K., 120
- Land forms, notes on the description of Yünnan-Tibet frontier, Drainage evolution on the (Davis), 413-415
- *Landes*, 273
  - Economic future (Sorre), *bibliogr.*, 274
- Landes, Henry, 352
- Lane, A. C., 118
- Lane, W. C.
  - Historical sketch, etc. (Twitchell), *rev.*, 190
- Lang, Capt. Andrew, 153
- Langanes, 312
- Languages
  - African (Meinhof), *bibliogr.*, 60
  - French in Italy, 146
  - Hittite, 360
  - Language as a factor in boundary making, 212
- Lansing, E. O., 418
- Lansing, Robert, 1
- La Plagne, Lacave, 359
- Lapland rosebay (ill.), 250
- La Puente, Ignacio, 56
- La Quiaca, 78, 79
- Larkin, T. O., 55
- La Rue, E. C.
  - Colorado River and its utilization, *rev.*, 54
- La Sal Mountains, 405
- Latin America. *See* South America
- Latitude
  - As climatic control in the United States, *note*, 263
- Lavalle y García, J. A. de, 424
- Leba, Lake
  - Kunisch Erwin, *bibliogr.*, 428
- Le Boullenger, 274
- Le Cadet, G., 358
- Lecce
  - Rainfall and population (Colamonico), *bibliogr.*, 193
- Le Conte, J. L., 406
- Lee, S. T., 57
- Lee, W. T., 352
- Leevining Canyon, 386
  - Road leading down (ill.), 384
- Leevining Creek, 385, 386
- Leeward Islands (Hawaii)
  - Elschner, Carl, *bibliogr.*, 358
- Legumes
  - Southern pine belt, 86 (ill.), 89
- Lehnerts, E. M.
  - Personal, 267
- Leipzig
  - Fair, 66
- Léon, J. M. Y., 57
- Leonard, W. E., 120
- Lesher, C. E., 271
- Levin, Emil, 428
- Lewis, John, 432
- Libby, O. G., 189
- Liberia
  - Climate, The, of Liberia and its effect on man (with ills.) (Ross), 387-402
- Libya
  - Bibliography (Ceccherini), *bibliogr.*, 277
  - Economic flora (Trotter), *bibliogr.*, 278
  - Frontiers (Masi), *bibliogr.*, 193

Lin, D. Y., *note*, 348
Lincoln Highway, 386
Lingard, Cal., topographic sheet, *map*, 190
Lissen, Rudolf, 127
Lisson, C. I., 354
Live stock
  Rio Grande do Sul, Brazil (Lee), *bibliogr.*, 57
  Southern pine belt, 88
Livingstone (David) Centenary medal
  Award to Rondon, *note*, 111
Loess
  Louisiana (Emerson), *bibliogr.*, 120
Loft, Genivera, 127, 193
Logan, Mt., 409, 411
Logging in the South (ill.), 86
Lombard, G. E., 271
Longyear City, 318, 320
Lonkener See, 286
Lönnrot, Elias, 375
Lord, R. H., 3
Lorenzi, Arrigo, 191, 192
Lorraine. *See* Alsace-Lorraine
Louisiana
  Loess-depositing winds (Emerson), *bibliogr.*, 120
  Sulphur (Pogue), *bibliogr.*, 120
Lowe, E. N.
  Mississippi: Its geology, geography, soils, and mineral resources, *rev.*, 422
Lowell, Mich., topographic sheet, *map*, 189
Lowie, R. H., 360
Lubin, David
  Obituary, 268
Lucas, C. P., 58
Lulofs, H. J., 200
Lumber
  United States, export trade (Pratt), *bibliogr.*, 271
  See also Forests; Timber
Lunt, W. E., 3
Lurquin, Constant, 354
Lütschg, O., 191
Lybyer, A. H., 60
Lyde, L. W.
  Theory of boundaries, 204, 217
Lyman, Herbert, 264
Lyman, W. D., 352
Lyon, H. L., 359
Lyons
  Blanchard, R., *bibliogr.*, 273
  Fair, 66
Lyons, H. G., 59
Lyra, A. T. de, 57

M

McAdie, Alexander, 197
MacCaughey, Vaughan, 359, 418 (*note*)
McCaw, G. T., 63
McConnell, R. G., 346
MacDougal, D. T., 263
Macedonia
  Ethnography (De Cristo), *bibliogr.*, 275
  Map, 276
Macedonian type, 94
McGoodwin, Preston, 183
Machatschek, Fritz, 195
Machias, Me., 165
  Topographic sheet, *map*, 272
McKay, Alexander (of New Zealand)
  Thomson, J. A., on, *bibliogr.*, 200
Mackenzie, J. K., 59
Mackenzie River
  Boulder pavements, *note*, 346
Mackie, G. B., 64
McKinley, Mt., 411
McLane, J. W. *See* Kearney, T. H., and others
Madras and Hyderabad topographic sheet 56 O, *map*, 279
Magellan, Ferdinand
  Studies on (Merino), *bibliogr.*, 200
Magnetism. *See* Terrestrial magnetism
Magoffin, R. V. D., 63
Maine
  Belfast, Cutler, Machias, and Pasadumkeag topographic sheets, *maps*, 272
  Raised bogs in eastern Maine (with ills.) (Nichols), 159-167
Maine, France. *See* Bas-Maine
Malaria
  Peruvian coast (La Puente), *bibliogr.*, 56
  Problem (Hoffman), *bibliogr.*, 280
Malaya
  Magic of (Harrison), *bibliogr.*, 357
Malmédy, 282
Malouines. *See* Falkland Islands
Malta. *See under* Mediterranean Sea
Man
  Climate and the Tertiary ape-man (Barrell), *bibliogr.*, 280
  Distribution over the earth, *note*, 52
  See also Anthropology; Human geography
Mannerheim, Gen., 376
Manrique, Francisco, 354
Maps
  Base maps of problem areas prepared by the Amer. Geogr. Soc. and adopted by the War Department, 5
  Reading, 37
  See also Cartography
Marbut, C. F., 107
Marcy, Mt.
  Fell-field, 239
Margerie, Emmanuel de, 200, 262 (*note*)
  Cullum medal presentation, with addresses, at Paris, *note*, 416
Marienwerder, 284
  Plebiscite area, 285
Marinelli, Olinto, 123, 200
  The regions of mixed populations in northern Italy (with map), 129-148
Mariners, ancient (Smith), *bibliogr.*, 200
Märjelen, Lake
  Anfossi, G., and Lütschg, O., *bibliogr.*, 191
Markets. *See* Commerce; Fairs
Marr, J. E., 426
Marschner, F. J., 340

Marseilles
  Blanchard, R., *bibliogr.*, 273
Marstrander, Rolf, 123
Martelli, Alessandro, 192
Martelli, U., 359
Martin, Lawrence, 3
Martínez, A. B., 123
Mary Sachs (ship), 297
Masi, Corrado, 193
Massachusetts
  Forest area, *note*, 51
  Geology (Emerson), *bibliogr.*, 272
Masterman, E. W. G., 61
Matanuska Valley, Lower, Alaska, topographic sheet, *map*, 351
Mathematical geography. *See* Astronomical geography; Cartography; Geodesy; Surveying
Mather, S. T., 383
Mato, Silvestre, 123
Matthes, F. E., 107
Mauna Loa
  Eruption of 1914 (Wood), *bibliogr.*, 359
Maurienne
  Blanchard, R., *bibliogr.*, 273
Mayor, A. G., *note*, 181
Meanders, incised, 415
Means, P. A., 354, 424
  Personal, 267
Mearns, E. A., 263
Medals. *See* American Geographical Society
Mediterranean Sea
  British possessions (Gibraltar, Malta, Cyprus) (Herbertson and Howarth in Oxford Survey, etc.), *rev.*, 61
  Human culture in the region, *note*, 53
Meigen, W., 427
Meinhof, Carl, 60
Melanesia
  Bibliography, 358
  Migration (Churchill), *bibliogr.*, 358
  Social history (Rivers), *bibliogr.*, 359
Melville Island, 310
Memel, 286, 287
Memel River. *See* Niemen River
Memorial to Major Powell, *note*, 264
Mercator, Gerardus, 328, 329, 333
  Gerhard Mercator und die Geographen unter seinen Nachkommen (Averdunk and Müller-Reinhard), *rev.*, 199
Merchant marine. *See* Shipping
Merida, 101, 106
Merino, Abelardo, 200
Merriam, J. C., 352
  Personal, 267
Merzig, 282, 283
Mesa Verde
  Pueblo and its people (Fewkes), *bibliogr.*, 352
Mesopotamia, 28
  Connection with Egypt, 25, 27
  Hakkiari highlands (Wigram), *bibliogr.*, 61
  Weather and war (Ward), *bibliogr.*, 61
Metcalfe, Charles, 60
Meteoric iron. *See under* Iron
Meteorology
  Atmospheric pressure and air circulation over northern Africa (Lyons), *bibliogr.*, 59
  Australia, flights (Taylor), *bibliogr.*, 126
  Australia, flying zone (Flockart and others), *bibliogr.*, 61
  Aviation and, *note*, 182
  Aviation and; opening of school of aëronautics in Italy (Eredia), *bibliogr.*, 123
  Bibliography, 197, 198
  Bolivia (Lurquin), *bibliogr.*, 354
  Brazil (Chisholm), *bibliogr.*, 57
  Climate, The, of Liberia and its effect on man (with ills.) (Ross), 387-402
  Denmark (La Cour), *bibliogr.*, 429
  English theory since 1866 (Shaw), *bibliogr.*, 426
  Introductory meteorology (National Research Council), *rev.*, 196
  Ocean Island (Gilbert and Ellice group) (Brooks), *bibliogr.*, 358
  Plata, Rio de la (Bazzano), *bibliogr.*, 122
  Transatlantic flights and, *note*, 419
  See also Climatology; Rainfall; Storms; U. S. Weather Bureau; Weather
Mexican Geographical Society
  Bulletin publication resumed, *note*, 118
Mexico
  Bibliography, 424
  Bureau of archeology and ethnography, *note*, 267
  Fairs, 73
  Standardization of time (Gallo), *bibliogr.*, 424
Mexico, Gulf of
  Coast salt domes (Rogers), *bibliogr.*, 120
Meyer, A. H., 189
Mezes, S. E., 2, 3, 416 (*note*)
Michael Sars (ship), *bibliogr.*, 127
Michigan
  Cedar Springs, Ionia, and Lowell topographic sheets, *maps*, 189
  Indian place names in the Upper Peninsula (Gagnieur), *bibliogr.*, 188
Michigan, Lake
  Abandoned beaches (Wright), *bibliogr.*, 189
Micronesia
  Bibliography, 358
Migrations
  Melanesia (Churchill), *bibliogr.*, 358
  Seasonal. *See* Transhumance
  Ships as evidence of early (Smith), *bibliogr.*, 360
  Southwestern farmers (Leonard), *bibliogr.*, 120
  United States, negroes (Horwill), *bibliogr.*, 271
Military geography
  Italian front (De Filippi), *bibliogr.*, 123
  Rhine bridgeheads (Belloc), *bibliogr.*, 427
  Uruguay (Mato), *bibliogr.*, 123
  World's coaling stations, importance, *bibliogr.*, 62

Military geography (*continued*)
  See also Cartography
Mill, H. R., 51
Mill, H. R., and Carle Salter
  On the distribution of rain . . . in the British Isles . . . 1917 (*British Rainfall*, Vol. 57), *rev.*, 354
Miller, B. L., 425
Miller, D. H., 3
Miller, G. J., 50
Miller, L. E., 424
Millikan, R. A., 107
Millis, H. A., 352
Millspaugh, C. F., *note*, 418
Milton, John
  Geographical program, 322
  "Moscovia," 323, 327, 333, 334
  Principle of original sources, 333
  Sources of his geographical knowledge, 334
  Use of Pierre Davity's "Geography," 322
Mineral waters
  Argentina (Corti; Ducloux), *bibliogr.*, 122
Minerals
  Atacama, Puna de (Barnabe), *bibliogr.*, 122
  California, 1917 (Bradley), *bibliogr.*, 351
  Spitsbergen, 317, 321
  United States independence (Smith), *bibliogr.*, 271
  Washington (Roberts), *bibliogr.*, 353
Mining
  Alaska, before 1867 (Golder), *bibliogr.*, 351
  Peru (Singewald and Miller), *bibliogr.*, 425
Minnesota
  Geographical factors in development of (Posey), *bibliogr.*, 189
  Northeastern Minnesota forest fires, The, of Oct. 12, 1918 (with maps, diagr., and ills.) (Richardson), 220-232
  Northern, devastation of forest fires in 1918 (map), 222
  Smoke from forest fires, *note*, 264
Minutilli, F., 277
Miranda, F. P., 123
Mississippi
  Mississippi: Its geology, geography, soils, and mineral resources (Lowe), *rev.*, 422
Mississippi-Louisiana
  Vicksburg topographic sheet, *map*, 120-121
Mississippi River
  First railroad to Lake Superior (Shippee), *bibliogr.*, 189
Mississippi Valley
  Marches of the dragoons (Pelzer), *bibliogr.*, 271
Mitimaes, 71
Moffit, F. H., 107, 351
Mohammedanism in Africa, 277
Moira, N. Y., topographic sheet, *map*, 272
Mokuaweoweo
  Effects of 1914 eruption (Wood), *bibliogr.*, 359
Moldau. *See* Vltava
Monaco, Prince of, 316
Monrovia, Liberia, 387, 388
  Americo-Liberian architecture (ills.), 398, 399
  Heat, 389
  Meteorological records, 391, 392
Monsoon
  African West Coast, 394
  Australia and India, 259
Montagu, Lord, 256, 258
Montana
  Geographic factors in population and industry (Freeman), *bibliogr.*, 190
  Geology (Collier), *bibliogr.*, 351
  Heart Butte topographic sheet, *map*, 190
  Porcupine Valley topographic sheet, *map*, 353
Montevideo
  Albes, Edward, *bibliogr.*, 121
  Climate, *note*, 113
Moore, R. C., 189
Morainic topography, forested (ill.), 366
Morandi, Luis, 113
Moresnet, 282
Morize, H., 57
Morris, Ill., topographic sheet, *map*, 189
Morris, F. K., 53, 108
Mort, Frederick, 426
Mortensen, Th., 432
"Moscovia" (J. Milton), 323, 327, 333, 334
Moslems, 29
Moss bogs, alpine, 254
Mossman, R. C., *note*, 265
Mount. *See* name of mountain
Mountain climbing, 156
  Alaska (Brooks), *bibliogr.*, 351
  Associated Mountaineering Clubs, *note*, 418
  Himalaya (Kellas), *bibliogr.*, 195
Mountains
  As boundaries, 203, 205
  As climatic control in the United States, *note*, 263
  North America, The unexplored mountains of (Bent), 403-412
  Studies of inhabitants in Italy (Arbos), *bibliogr.*, 192
  Western United States, high peaks, 403
Mouvement Géographique, Le, resumption, *note*, 421
Muir, John, 405, 408, 409
Mulberry trees in China (ill.), 13
Mulford, J. C., 271
Müller-Reinhard, J. *See* Averdunk, H., and J. Müller-Reinhard
Müns, R., 428
Münster, Sebastian, 323, 325, 326, 328, 333
Murphy, R. C., 352
Murray River
  Early navigation (Lewis), *bibliogr.*, 432
Muscovy Company, 311, 312, 314
Musgrave Ranges
  Geology of region south of (Jack), *bibliogr.*, 126
Musk oxen, hunting, 310
Musoni, Francesco, 275

Musset, René
  Le Bas-Maine: Étude géographique, *rev.*, 272
Myers, G. H., 120
Mylius, H., 428

N

Names. *See* Place names
Nansen, Fridtjof, 291, 297
Nardus stricta (Smith), *bibliogr.*, 426
Natazhat, Mt., 411
National Council of Geography Teachers, 41, 50 (*note*)
National highways. *See under* Roads
National parks. *See* Parks
National Research Council
  Introductory meteorology, *rev.*, 196
Nationality
  As a factor in boundary making, 212
  Yugo-Slavs (Cvijić), *bibliogr.*, 275
  See also Races
Natural history
  Year, A, of Costa Rican natural history (Calvert), *rev.*, 423
Navajo Peak, 405
Navigation
  Kentucky River (Verhoeff), *bibliogr.*, 120
  Murray River, Australia (Lewis), *bibliogr.*, 432
  Plata estuary (Miranda), *bibliogr.*, 123
  United States, 1917, *bibliogr.*, 271
Near East
  Coastal populations, 217
Negroes
  Liberia, 387
  Migration in the United States (Horwill), *bibliogr.*, 271
Neidenburg, 284, 285
Nevada
  Mountains, 405
  Snow surveying (Church), *bibliogr.*, 55
New Caledonia
  Compton, R. H., *bibliogr.*, 358
  Geology (Piroutet), *bibliogr.*, 359
  La Plagne, Lacave, *bibliogr.*, 359
New England
  Fell-fields (map), 235
  Forest area changes since 1620 (with diagr.), *note*, 50
New England Range, N. S. W.
  Geology and physiography (Benson), *bibliogr.*, 125
New Guinea
  Dutch, anthropology (Broek), *bibliogr.*, 358
  Dutch, flora (Gibbs), *bibliogr.*, 358
New Hampshire. *See* White Mountains
New Hampshire-Maine
  Dover topographic sheet, *map*, 272
New Jersey
  Sandy coast protection (Cresson), *bibliogr.*, 272
  Soils of southern (Bonsteel), *bibliogr.*, 272
New Mexico
  Big Hatchet Peak, Cienega Springs, Columbus, Hachita, Hermanas, Peloña, Victorio, and Walnut Wells topographic sheets, *maps*, 353
  Historical sketch of Governor William Carr Lane, etc. (Twitchell), *rev.*, 190
  Mountains, 406
New Orleans
  Temperature (Cline), *bibliogr.*, 119
New South Wales
  Geology and petrology (Benson), *bibliogr.*, 125
New World
  European early struggle for trade (Davenport), *bibliogr.*, 64
New York (City)
  Flora in the vicinity of New York (Taylor), *rev.*, 271
New York (State)
  Chamber of Commerce, 1768-1918 (Bishop), *bibliogr.*, 272
  Hornell, Moira, Oneonta, Russell, and Unadilla topographic sheets, *maps*, 272
New York Zoological Society
  British Guiana Research Station reopened, *note*, 183
New Zealand
  Bibliography, 125-126, 432
  Forestry (Schlich), *bibliogr.*, 432
  McKay, Alexander, and his geological work (Thomson), *bibliogr.*, 200
  Pleistocene glaciation (Park), *bibliogr.*, 432
  Population distribution (Kissel), *bibliogr.*, 126
  River terraces (Cotton), *bibliogr.*, 125
Newbigin, M. I., 276
Newell, F. H.
  Cullum medal award, *note*, 111
Newfoundland
  Grand Banks (Linssen), *bibliogr.*, 127
Newlands, Alexander, 426
Newnham, E. V., 426
News. *See* Geographical news
Nice, 147
  Blanchard, R., *bibliogr.*, 273
Nichols, G. E.
  Raised bogs in eastern Maine (with ills.), 159-167
Niemen River, 287, 290
Nile-Jordan-Euphrates route, 27
Nine Point Mesa, Tex., topographic sheet, *map*, 121
Nizhni Novgorod, 78
Noer, O. J., 189
Nogat River, 284-286
Nomenclature
  Geologic terms, 173
Nordén, Arthur, 429
Nordenskiöld, Erland, 425
  Finland: The land and the people (with maps and ills.), 361-376
Norsemen
  Spitsbergen, possible discovery, 312

North America
  Alpine fell-fields of eastern North America (with maps and ills.) (Harshberger), 233-255
  Unexplored mountains, The, of North America (Bent), 403-412
  See also Americas, The
North Atlantic states
  Bibliography, 272
North-Central states
  Bibliography, 188
  Maps, 189
North Dakota
  Map, 189
North Sea
  As a boundary, 211
Northern Exploration Co., 319
Northrop, J. D., 182
Northrup, W. P.
  Personal, 267
North-West Frontier Province (Douie), *bibliogr.,* 279
Norton, W. H., 271
Norway
  Bibliography, 429
  Winter of 1917 (Rabot), *bibliogr.,* 429
Norwegians
  Spitsbergen and, 312, 315, 318, 319, 320
Novarese, Vittorio, 124
Novaya Zemlya, 311, 312
Nowitka. *See* Cosna-Nowitka

O

Oahu
  Rainfall, *note,* 419
Oases
  Baharia, cultivated lands, *map,* 278
  Ghàdames (Eredia), *bibliogr.,* 278
  Siwa, military attack on, *bibliogr.,* 278
Obituary
  Booy, Theodoor de, 268
  Lubin, David, 268
  Raven, A. A., 112
  Van Hise, C. R., 53
Ocean currents
  As climatic control in the United States, *note,* 263
Ocean Island (Gilbert and Ellice group)
  Meteorology (Brooks), *bibliogr.,* 358
Oceanography
  Buenos Aires (province) (Kantor), *bibliogr.,* 122
  Michael Sars in the North Atlantic (Gravier), *bibliogr.,* 127
Oceans
  Bibliography, 126
  Weather reports and forecasts for aviators, *note,* 421
Ochils
  Earthquakes (Davison), *bibliogr.,* 425
Oder River, 290
Oettli, M., 246
O'Gorman, Mervyn, 261
Ohio
  Felicity, Fort Recovery, and Seaman topographic sheets, *maps,* 189
Oil, mineral. *See* Petroleum; Wells
Okada, T., 195
Oklahoma
  Bibliography of geology (Trout and Myers), *bibliogr.,* 120
  Pawhuska quadrangle (Heald), *bibliogr.,* 120
  Wapanucka limestone (Wallis), *bibliogr.,* 120
Old order. *See under* China
Old Town, Me., 164
Oletzko, 284, 285
Ollas, 78
Olofsborg (ill.), 373
Olufsen, Ole, 193
Oneonta, N. Y., topographic sheet, *map,* 272
Ordnance maps
  Unstead, J. F., *bibliogr.,* 63
Oregon
  Acquisition (Cleland), *bibliogr.,* 55
  Kerby and Troutdale topographic sheets, *maps,* 353
Orient
  Modernizing (Cooper), *bibliogr.,* 195
  Russo-Japanese treaty, importance (Rivetta), *bibliogr.,* 195
  Trade routes (Lybyer), *bibliogr.,* 60
  See also Far East; Near East
Original sources, 333
Orography
  Italian islands (Anfossi), *bibliogr.,* 192
Otranto
  Rainfall (Colamonico), *bibliogr.,* 193
Overbeck, R. M., 351
Owens Creek, Cal., topographic sheet, *map,* 190
Oxford Survey. *See* British Empire; British Isles; Mediterranean Sea

P

Pacific coast
  Discovery of central route to (Dale), *bibliogr.,* 270
  Occupation, and Asiatic trade (Cleland), *bibliogr.,* 55
Pacific Ocean
  Islands, present state (Thurn), *bibliogr.,* 359
  Islands belonging to the United States (Biddle), *bibliogr.,* 358
  New Pacific, The: British policy and German aims (Fletcher), *rev.,* 124
Paine, G. P., 197
Paleontology
  Lake Lahontan (Merriam), *bibliogr.,* 352
Palestine
  Agriculture, soil, etc., 30
  American attitude, 28
  Bibliography, 60
  Climate of ancient, *note,* 347

Palestine (*continued*)
  Future of Palestine, The (with map) (Huntington), 24-35
  Geography and history (Genocchi), *bibliogr.*, 60
  Map, 61
  Physical geography (Stefani), *bibliogr.*, 61
  Relation to routes to India (map), 26
  Resources, 30
  Roads and scenery, 33
  Tourists, 32
  Weather and war (Ward), *bibliogr.*, 61
Palisade Group (Sierra Nevada), 406
Pallasca, Peru
  Coal (Léon), *bibliogr.*, 57
Palmer, Howard, 407, 408
Palmyra Island
  Description and flora (Rock and others), *bibliogr.*, 359
Pampero, note, 113, 114
Pan-Americanism
  Panamericanismo, El: Su pasado y su porvenir (Calderón), *rev.*, 127
Panamint Mountains, 406
Pan-Germanism
  Africa (Thierry), *bibliogr.*, 430
Pannonic type, 96
Papua
  Annual report for 1916-17, *bibliogr.*, 359
Papuans
  Anthropology (Broek), *bibliogr.*, 358
Paradise Valley, Idaho, topographic sheet, *map*, 190
Parent, ——, 358
Paris
  Presentation of Cullum medal to E. de Margerie, *note*, 416
Park, James, 432
Parks
  Glacier National, lakes (Elrod), *bibliogr.*, 352
  National Parks, season of 1918, *bibliogr.*, 352
  National Parks and Monuments and the Associated Mountaineering Clubs, *note*, 418
  Rocky Mountain National, geology (Lee), *bibliogr.*, 352
Parry, Sir Edward, 316
Pasadumkeag, Me., topographic sheet, *map*, 272
Patagonia
  Ports (Kühn), *bibliogr.*, 123
Patten, S. N., 215
Patton, C. H.
  The lure of Africa, *rev.*, 277
Pawhuska quadrangle, Okla.
  Geology (Heald), *bibliogr.*, 120
Peace, problem of world, 43
Peace conference
  Contribution of the American Geographical Society (with map), 1-10
  Data needed, 38
Peace treaty
  New boundaries of Germany, The, according to the peace treaty (with map), 281-290
  Provisions of geographical interest, various, 290
Pearsall, W. H., 426
Peary, R. E., 149, 155, 293, 297
Peat, 162, 163
  Nardus stricta in relation to (Smith), *bibliogr.*, 426
  Tierra del Fuego (Bonarelli), *bibliogr.*, 122
Pecos Valley
  Rainfall in upper (Hallenbeck), *bibliogr.*, 352
Peene River
  Climatology and hydrology (Levin), *bibliogr.*, 428
Pellice River
  Anthropogeography in the valley (Roletto), *bibliogr.*, 124
  Waldensians of the valley, *note*, 265
Pelona, N. M., topographic sheet, *map*, 353
Pelzer, Louis, 271
Pennine Chain
  Edale: A study (Fawcett), *bibliogr.*, 425
  Plant associations (Adamson), *bibliogr.*, 355
Peroi, 134
Personal, 53, 118, 187, 267
Peru
  Agriculture, 71
  Ancient art (Means), *bibliogr.*, 354
  Ancient festivals, 74
  Area (Carvajal), *bibliogr.*, 56
  Bibliography, 56, 354, 424
  Boundary with Bolivia (Holdich), *bibliogr.*, 56
  Coal deposits (Léon), *bibliogr.*, 57
  Conquest; Gasca letters (Saville), *bibliogr.*, 425
  Descriptive data, *bibliogr.*, 425
  Fairs, 73
  Irrigation (Sutton), *bibliogr.*, 425
  Malaria (La Puente), *bibliogr.*, 56
  Mining industry (Singewald and Miller), *bibliogr.*, 425
  Petroleum industry (Walle), *bibliogr.*, 425
  Rubber center (Bayless), *bibliogr.*, 56
  Sea water phenomenon (Lavalle y García), *bibliogr.*, 424
Perugia
  Agronomy (Canavari), *bibliogr.*, 192
Petra, 27, 34
Petroleum
  Peruvian industry (Walle), *bibliogr.*, 425
  South American resources, *note*, 182
  World conditions (Arnold), *bibliogr.*, 198
Phenology
  British Isles (Clark and Adames), *bibliogr.*, 355
Philips, Edward, 322, 324
Photography
  Aërial, 157

Photography *(continued)*
  Birds in the Falkland Islands (Beck), *bibliogr.*, 122
Physical Geography. *See* Climatology; Geology and geomorphology; Hydrography; Meteorology; Oceanography; Phytogeography.
Physiography
  Australia, great barrier reef (Davis), *bibliogr.*, 125
  See also Geology and geomorphology
Phytogeography
  Dutch New Guinea (Gibbs), *bibliogr.*, 358
  Nardus stricta in North Britain (Smith), *bibliogr.*, 426
Piave River
  Italian front to Brenta River, *map*, 124
Piccoli, L. L., 432
Piedmontese Alps
  Ruitor glacier lakes (Preller), *bibliogr.*, 124
Piemeisel, R. L. *See* Kearney, T. H., and others
Pierce, F. C., 120
Pine
  Cut-over land, 83, 84, 88
  Cut-over land, clearing (ill.), 84
  Cut-over land in the South (ills.), 86, 87
  Long-leaf, cupped for pitch (ill.), 83
  Long-leaf, distribution in southeastern United States (map), 82
  Southern long-leaf pine belt, The (with map and ills.) (Emerson), 81-90
Pines, Isle of (Pacific Ocean)
  Compton, R. H., *bibliogr.*, 358
Piroutet, Maurice, 359
Pirua, 73
Piura-Tumbes region, Peru
  Social conditions (Means), *bibliogr.*, 424
Place names
  Adige River, upper (Tolomei), *bibliogr.*, 124
  Michigan, Upper Peninsula (Gagnieur), *bibliogr.*, 188
  Venezia Giulia, *bibliogr.*, 124
Plankton, 424
Plants
  Associations of the Pennine Chain (Adamson), *bibliogr.*, 355
  Colorado, abandoned roads (Shantz), *bibliogr.*, 353
  Desert perennials (Shreve), *bibliogr.*, 353
  Ethnobotany of the Tewa Indians (Robbins and others), *bibliogr.*, 190
  See also Phytogeography
Plata, Rio de la
  Estuary (Miranda), *bibliogr.*, 123
  Meteorology (Bazzano), *bibliogr.*, 122
Po
  Ethnic uniformity of the valley, 129
  Human geography (Bénévent), *bibliogr.*, 192
  Rainfall in basin (Giandotti), *bibliogr.*, 123
  Subterranean hydrology of the plain (Stella), *bibliogr.*, 124
Pogue, J. E., 120
Point Reyes, Cal., topographic sheet, *map*, 353
Point Sur, Cal., topographic sheet, *map*, 353
Pola, 135
Poland
  Boundary problem, 216
  Peace treaty territorial provisions, 283
Polar bears
  Arctic source of food, 304
  Visits to camp, 306
Polar regions. *See* Arctic, etc.
Political geography
  Egypt, ancient (Rolfe), *bibliogr.*, 193
  Italy (Del Zanna), *bibliogr.*, 123
  Switzerland (Hauser; Lorenzi), *bibliogr.*, 191
Pollenziner See, 286
Polybius (Lulofs), *bibliogr.*, 200
Polynesia
  Bibliography, 358
Pomerania
  Coastal lakes (Kunisch), *bibliogr.*, 428
  Literature of regional geography (Praesent), *bibliogr.*, 428
Poor, C. L., 187
Population
  Expansion as a factor in boundary making, 213
  Finland (with map), 365, 366
  Human agglomerations, *note*, 52
  Italy, The regions of mixed populations in northern (with map) (Marinelli), 129-148
  Montana (Freeman), *bibliogr.*, 190
  New Zealand, distribution (Kissel), *bibliogr.*, 126
  United States, racial types (Sullivan), *bibliogr.*, 271
Porcupine Valley, Mont., topographic sheet, *map*, 353
Porsild, M. P.
  Election to Corresponding Membership, Amer. Geogr. Soc., *note*, 112
Port Angeles, Wash., topographic sheet, *map*, 353
Portocarrero, J. N., 425
Ports
  Patagonia (Kühn), *bibliogr.*, 123
Portuguese
  Refugees on Antillia, 100
Posen, 283
Posey, C. J., 189
Posnansky, Arturo
  Una metrópoli prehistórica en la América del Sud, *rev.*, 55
Post, C. B., 189
Potash
  New deposits (Sallior), *bibliogr.*, 199
Potato
  Bolivia (Ballivián and Tovar), *bibliogr.*, 56
Potosí
  Fair, 73, 77

Powell, J. W.
  Dawson, T. F., *bibliogr.*, 351
  Memorial, *note*, 264
Powell Slough, Cal., topographic sheet, *map*, 353
Power. *See* Water power
Powers, Sidney, 359
Praesent, Hans, 428
Pratt, E. E., 271
Precipitation. *See* Rainfall
Prehistory
  Mesa Verde pueblo (Fewkes), *bibliogr.*, 352
  Tiahuanaco (Posnansky), *rev.*, 55
  See also Archeology
Preller, C. S. du R., 124
Pressure. *See* Atmospheric pressure
Preston, Idaho-Utah, topographic sheet, *map*, 353
Prestonburg, Ky., topographic sheet, *map*, 120
Princesse Alice (ship), 316
Prussia. *See* East Prussia; West Prussia
Ptolemaeus, Cl. (Lulofs), *bibliogr.*, 200
Pucara, 78
Pueblo, Mesa Verde (Fewkes), *bibliogr.*, 352
Puglia
  Population (Colamonico), *bibliogr.*, 192
Pumpelly, Raphael
  My reminiscences, *rev.*, 64
Punjab
  Canal system (Benton), *bibliogr.*, 279
  Description (Douie), *bibliogr.*, 279
Puno, 78
Puquina, *note*, 113
Purcell Range, 407
Purchas, Samuel, 326, 327, 333, 335, 336
Pyrenees
  As a boundary, 209
  Railways proposed between France and Spain, *note*, 346
Pyynikki (ill.), 366

Q

Quarrying
  Cement manufacture and (Bowles), *bibliogr.*, 270
Quechua Indians, *note*, 113
  Southern Bolivia (Miller), *bibliogr.*, 424
Queensland
  Anthropology (Hamlyn-Harris), *bibliogr.*, 61
  Flowing wells (Gregory), *bibliogr.*, 61

R

Rabot, Charles, 429
Races
  Finns, 361
  Race as a factor in boundary making, 212
  Types in the United States (Sullivan), *bibliogr.*, 271
  Values and prospect (Humphrey), *bibliogr.*, 360
  Yugo-Slavs, 92
  See also Ethnology
Rae, John, 291
Railroads
  Africa, development (Metcalfe), *bibliogr.*, 60
  Bolivia (Reid), *bibliogr.*, 425
  Feasible route between Egypt and eastern parts of British Empire, 27
  Finland, 374
  First between Mississippi River and Lake Superior (Shippee), *bibliogr.*, 189
  Proposed line to tap Red Basin of Szechwan, China, *note*, 185-186
  Russian Asia (Blanc), *bibliogr.*, 278
  Trans-Pyrenees, *note*, 346
  War, The, and the Bagdad Railway, etc. (Jastrow), *rev.*, 60
Rainfall
  Asia (Eckhardt), *bibliogr.*, 195
  Berkeley, Cal. (Reed), *bibliogr.*, 190
  British Isles, 1917 (Mill and Salter: *British Rainfall*, Vol. 57), *rev.*, 354
  British Isles, as effect of gunfire, *note*, 51
  Chile, *note*, 264
  Chile, 1849-1915, *bibliogr.*, 122
  England (Newnham), *bibliogr.*, 426
  Germany (Hellmann), *bibliogr.*, 427
  Honolulu, *note*, 419
  Indo-China (La Cadet), *bibliogr.*, 358
  Lecce (Colamonico), *bibliogr.*, 193
  Liberia, 396
  Otranto (Colamonico), *bibliogr.*, 193
  Palestine, 31
  Pecos Valley, upper (Hallenbeck), *bibliogr.*, 352
  Po basin (Giandotti), *bibliogr.*, 123
  Rainy days and rain probability in the United States (with maps) (Ward), 44-48
  Results of rainfall observations made in South Australia and in the Northern Territory, etc. (Hunt), *rev.*, 432
  United States, average annual number of rainy days (map), 44
  United States, mean annual probability of rain (map), 47
  United States, normal annual precipitation map of the (Van Cleef), *rev.*, 269
  See also Climatology; Meteorology; U. S. Weather Bureau; Weather
Rainier, Mt.
  Snowfall (Fisher), *bibliogr.*, 352
Raivavai
  Statues (Brown), *bibliogr.*, 358
Ramaley, Francis, 352
Raven, A. A.
  Obituary, 112
Read, A. C., *note*, 420, 421
Reagan Canyon, Tex., topographic sheet, *map*, 121
Reboul, G., 274
Reclamation. *See* U. S. Reclamation Service
Réclus, Onésime
  Grande Géographie Bong illustrée, Vol. 3 (Scandinavia and Asia), *rev.*, 194
Red Cross, surgical sphagnum for, 159

Red Karens
  Scott, George, *bibliogr.*, 358
Red Sea
  Nel Mar Rosso: Rendiconto di una missione inviata dalla Società Africana d'Italia, Aprile-Luglio, 1913 (Cufino), *rev.*, 59
Reed, W. G., 190
  Work on the "Atlas of American Agriculture," 340, 344
Reefs
  Australia, great barrier reef (Davis), *bibliogr.*, 125
  See also Coral islands and reefs
Reforestation
  Southern long-leaf pine belt, 84
Reger, D. B., 417
Regional geography, 172
  Berlin study (Fleure), *bibliogr.*, 427
  Forfarshire (Hosgood) *bibliogr.*, 426
  Jura Mountains (Chambard), *bibliogr.*, 274
  Pomerania and Rügen, literature (Praesent), *bibliogr.*, 428
Regionalism
  France (Carter; Clerget), *bibliogr.*, 274
Regions
  France, proposed new subdivisions (with maps), 114, 115, 116
Regny. *See* Vinassa de Regny
Reid, W. A., 425
  Bolivia, the heart of a continent: A few facts about the country and its activities, *rev.*, 424
Requin, Major, 10
Reservoirs in India, artificial (map), 279
Rhaeto-Romans, 144, 145
Rhine
  Bridgeheads, strategic value (Belloc), *bibliogr.*, 427
Rhine-Meuse canal, 290
Rhode Island
  Geology (Emerson), *bibliogr.*, 272
Ricchieri, Giuseppe, 193, 200
Rice
  Production and uses, *bibliogr.*, 199
  Threshing and winnowing, China (ills.), 21, 22
Richardson, H. W.
  The northeastern Minnesota forest fires of Oct. 12, 1918 (with maps, diagr., and ills.), 220-232
Richardson, Ralph, 426
Richthofen, F. von, 185
Riggs, Thomas, Jr., 410
Rijp, Jan Cornelis, 311
Rio de Janeiro, Bay of
  Guide (Lacerda), *bibliogr.*, 57
Rio Grande, southern United States
  History of lower valley (Pierce), *bibliogr.*, 120
Rio Grande do Norte, Brazil
  Dutch rule (Lyra), *bibliogr.*, 57
Rio Grande do Sul, Brazil
  Cattle industry (Lee), *bibliogr.*, 57
Rio Hondo, Argentina
  Hot springs (Corti), *bibliogr.*, 122
Río Joan, Francisco del
  Africa Occidental Española, *rev.*, 429
Rivers
  As boundaries, 204, 206
  Braided stream in India (map), 280
  Colorado River and its utilization (La Rue), *rev.*, 54
  Drainage evolution on the Yünnan-Tibet frontier (Davis), 413-415
  France and Belgium, navigable (Barrecchia), *map*, 274
  Friuli type (Gortani), *bibliogr.*, 123
  Internationalization in Europe, 290
  Scotland (Mort), *bibliogr.*, 426
  Tees, Engl., study (Fawcett), *bibliogr.*, 426
Rivers, W. H. R., 359
Rivetta, P. S., 195
Rixford, G. P., 352
Roads
  Colorado, plant succession on abandoned (Shantz), *bibliogr.*, 353
  Finland, 371, 374
  National highways of the United States (Mulford and others), *map*, 271
  Palestine, 33
  Tioga Road, The, across the Sierra Nevada (with map and ills.) (Belden), 377-386
Robbins, W. W., 190, 353
Roberts, Milnor, 353
Robinson, Doane, 189
Roccati, Alessandro, 191
Rock, J. F., 359
Rockland, Me., 164
Rocky Mountain National Park, geology (Lee), *bibliogr.*, 352
Rocky Mountains
  Conifers (Sudworth), *bibliogr.*, 353
Rodríguez, E. M., 191
Roemer, Adolf, 191
Rogers, G. S., 120
Rohe, Alice, 124
Roletto, G. B., 124, 265 (*note*)
Rolfe, Deette, 193
Rolfe, F., 190
Romanche River
  Lower basin (Allix), *bibliogr.*, 273
Rondon, C. M. da S.
  Livingstone medal award, *note*, 111
Roorbach, G. B., 199
Roscoe, John, *note*, 347
Rose, Mt., Nevada
  Snow surveying (Church), *bibliogr.*, 55
Roseires, *map*, 60
Ross, Emory
  Climate of Liberia, The, and its effect on man (with ills.), 387-402
  Portrait, 393
Roswell, N. M.
  Rainfall (Hallenbeck), *bibliogr.*, 352
Rouch, Jules, 187
Routes
  Central route to Pacific coast, discovery (Dale), *bibliogr.*, 270
  Oriental trade (Lybyer), *bibliogr.*, 60

Routes (*continued*)
  Overland to Constantinople (Evans), *bibliogr.*, 275
  Sahara caravans (Loft), *bibliogr.*, 193
Royal Geographical Society
  Thirty years' work (Keltie), *bibliogr.*, 200
Royal Scottish Geographical Society
  Early maps of Scotland, *note*, 266
Rubber
  Peru's center (Bayless), *bibliogr.*, 56
Rügen
  Literature of regional geography (Praesent), *bibliogr.*, 428
Ruins
  Arizona (Colton), *bibliogr.*, 351
  El Alfarcito (Debenedetti), *bibliogr.*, 122
Ruitor (Piedmontese Alps)
  Glacier lakes (Preller), *bibliogr.*, 124
Russell, N. Y., topographic sheet, *map*, 272
Russell, I. C., 409
Russia
  Aviators and airplanes, 154, 156
  Fairs, 66
  Finnish relations, 362
  Machatschek, F., *bibliogr.*, 195
  Russia, Germany, and Asia, *bibliogr.*, 62
Russian Central Asia
  Bibliography, 357
  Geography (Friederichsen), *bibliogr.*, 357
  Russian and nomad: Tales of the Kirghiz Steppes (Fell), *rev.*, 430
  Through Russian Central Asia (Graham), *rev.*, 357
Russian Karelia, 376
Russians
  Russian and nomad: Tales of the Kirghiz Steppes (Fell), *rev.*, 430
  Spitsbergen and, 312

S

Saar Basin
  Peace treaty provision, 282
Sacco (valley in Latium)
  Bianchi, A., *bibliogr.*, 192
Sacco, Federigo, 191
Sahara
  Bibliography, 277-278
  Caravan trade (Loft), *bibliogr.*, 193
  Diary of an eighteenth century journey (Hornemann), *bibliogr.*, 278
  Mohammedan graves (Olufsen), *bibliogr.*, 193
  See also Egypt
Saima Canal and lake basin, 371, 374
St. Elias, Mt., 409, 411
St. Gall
  Climatology of the district (Roemer), *bibliogr.*, 191
St. John, Harold, 162
St. Michaels Island (Azores), 104, 105, 106
St. Wendel, 283
Salisbury, R. D., and H. H. Barrows
  The environment of Camp Grant, *rev.*, 188
Sallior, P., 124, 199
Salt
  Gulf (of Mexico) Coast (Rogers), *bibliogr.*, 120
  In food, 293
Salter, Carle. *See* Mill, H. R., and Carle Salter
Samoa
  American (Crose), *bibliogr.*, 358
San Diego
  Airplanes flying (ill.), 150
San Diego Bay
  Map, 190
San Francisco
  Dune vegetation (Ramaley), *bibliogr.*, 352
San Francisco Mountains
  Ruins (Colton), *bibliogr.*, 351
San Marino
  Description (Rohe), *bibliogr.*, 124
San Paolo. *See* São Paulo
Sand dunes. *See* Dunes
Santa Cruz de la Sierra, Bolivia, *bibliogr.*, 56
Santander, Bay of, 178
Santiago Peak, Tex., topographic sheet, *map*, 121
Santibáñez, Enrique, 118
Santo Tomas, Tex.
  Cannel coal (Ashley), *bibliogr.*, 119
São Francisco River
  Magnetic survey of basin (Costa), *bibliogr.*, 57
São Paulo, Brazil
  Climate (Godinho), *bibliogr.*, 57
  Description (Hoover), *bibliogr.*, 57
  Italian settlers (Capra), *bibliogr.*, 57
Sardinia
  Ancient (Boucher), *bibliogr.*, 192
  Cossu, A., *bibliogr.*, 193
Sarre. *See* Saar
Sauces, Bolivia, 78
Savić, V. R.
  The reconstruction of South-Eastern Europe, *rev.*, 274
Saville, M. H., 425
Savoy. *See* Haute-Savoie
Sbrocca, A., 193
Scandinavia
  Bibliography, 428
  Grande Géographie Bong illustrée, Vol. 3 (Reclus), *rev.*, 194
  Pictured rocks (Nordén), *bibliogr.*, 429
  Winter of 1917 (Rabot), *bibliogr.*, 429
  Winter storms (Hildebrandsson), *bibliogr.*, 429
Scania
  Coalfields (Grönwall), *bibliogr.*, 428
Scenery
  Columbia River (Lyman), *bibliogr.*, 352
  Egypt (Bell), *bibliogr.*, 277
  English Lake District (Marr), *bibliogr.*, 426
  Palestine, 33
  Tioga Road, Sierra Nevada, 377
Schenk, Rudolf, 428
Schiaparelli, Ernesto, 193

Schiefflin, Liberia, 388
  Meteorological records, 390, 391, 392
  Thermometer shelter, raingage and portrait of Emory Ross (ill.), 393
Schleswig. *See* Slesvig
Schlich, William, 432
Schoenmann, L. R., 189
Schoff, W. H., 195
Schokalsky, Jules de, 278
Schroeder, R. W., 152, 153
Schröter, C., 245
Science
  Geography and its relation to other sciences, 168
Scientific spirit in Botero, 328
Scilly Islands, 426
Scotland
  Early maps, *note,* 266
  Early maps (Inglis), *bibliogr.,* 426
  New Parliamentary division (Richardson), *bibliogr.,* 426
  Rivers (Mort), *bibliogr.,* 426
  Water power (Newlands), *bibliogr.,* 426
Scott, Ernest
  A short history of Australia, *rev.,* 125
Scott, George, 358
Scott, J. B., 63
Scottish Spitsbergen Syndicate, 319
Scriven, G. P., 276
Scurvy, 293, 315, 320
Sea
  Danish waters, value (Gerain), *bibliogr.,* 428
  Freedom of the seas, etc.—Grotius's dissertation (Scott), *bibliogr.,* 63
  See also Oceans
Seals
  Arctic, abundance, 299
  Eskimos skinning (ill.), 292
  Hunting in the Arctic, 300
Seaman, Ohio, topographic sheet, *map,* 189
Seismology
  Australia (Komorowicz), *bibliogr.,* 432
Selkirk Range, 407
Sellier, L. M., 120
Semple, Ellen C., 108
Sequoia (Crocker's Station), 383
Serbians, 91, 92
Settlement
  Africa (Buxton), *bibliogr.,* 429
  South Australia (Lewis), *bibliogr.,* 432
Seven Cities, Island of
  Anonymous world map of about 1520 showing (map), 102
  Desceliers map of 1546 showing (map), 104
  Island of the Seven Cities, The (with maps) (Babcock), 98-106
  Ortelius map of 1750 showing (map), 105
Seymour, Charles, 3
Shaler, N. S.
  On bogs, 161, 162
Shantz, H. L., 353
  See also Kearney, T. H., and others
Sharpe, Alfred, 429
Shaw, Napier, 198, 426
Shippee, L. B., 189
Shipping
  Finnish, 374
  German development (Snow), *bibliogr.,* 64
  Ships as evidence of early migrations (Smith), *bibliogr.,* 360
Shklovsky, I. W. ("Dioneo"), 278
Shklovsky, Z., 278
Shops (Slavic group), 94, 95
Shores. *See* Coasts
Shotwell, J. T., 2
Shreve, Forrest, 263, 353
Shufeldt, R. W., 432
Shuler, E. W., 120
Shumadians, 94
Shunking, *note,* 186
Siberia
  Basins, comparative extent (Schokalsky), *bibliogr.,* 278
  Bibliography, 278
  Colonization (Blanc), *bibliogr.,* 278
  Future (Demianof), *bibliogr.,* 278
  Railroads (Blanc), *bibliogr.,* 278
Sierra Nevada
  Main crest (ill.), 383
  Peaks, 406
  Tioga Road, The, across the Sierra Nevada (with map and ills.) (Belden), 377-386
Signposting in deserts, *note,* 262
Silesia. *See* Upper Silesia
Silk
  Ancient commerce in Asia (Schoff), *bibliogr.,* 195
  Cocoons, Chinese family at work among (ills.), 14
  Farming in China, 12
  Spinning, China (ills.), 14, 16, 20
  Weaving, China (ills.), 17, 20
Simpson, G. C., 198
Sinai, Peninsula of
  West central, geology (Ball), *map,* 278
Singewald, J. T., Jr., 425
Sion, Jules, 358
Sir Alexander, Mt., 407
Sir Sandford, Mt., 408
Siskiyou Mountains, 404
Siwa Oasis, attack on, *bibliogr.,* 277
Skeats, E. W., 359
Slava, 93, 94, 95
Slavs
  Adriatic (Evans), *bibliogr.,* 275
  Alpine colonization, 131
  Balkan invasion, 91
  Balkan Peninsula (Gallois), *bibliogr.,* 275
  See also Yugo-Slavs
Slesvig
  Hydrography (Breckwoldt), *bibliogr.,* 427
  Peace treaty provision, 287
Sloane, T. G., 432
Slovenes, 91, 96
Small nations. *See* Nationality
Smeerenborg, 314
Smith, A. D. H., 1-2
Smith, G. Elliot, 200, 360
Smith, G. O., 271
Smith, Middleton, 345

Smith, Philip S.
  The Lake Clark-Central Kuskokwim region, Alaska, *rev.*, 350
Smith, William G., 426
Smoke from Minnesota forest fires, *note*, 264
Smyrna figs. *See* Figs
Smyth, W. H., 278
Snelling, Cal., topographic sheet, *map*, 353
Snow
  French Alps (Bénévent), *bibliogr.*, 273
  Germany, North (Lachmann), *bibliogr.*, 428
  Mt. Rainier (Fisher), *bibliogr.*, 352
  Surveying, Nevada (Church), *bibliogr.*, 55
  Tripoli (Eredia), *bibliogr.*, 277
Snow, C. D., 64
Snow goggles, native Eskimo (ill.), 302
Social organization
  Melanesia (Rivers), *bibliogr.*, 359
  Piura-Tumbes region, Peru (Means), *bibliogr.*, 424
Società Africana d'Italia
  Nel Mar Rosso, etc. (Cufino), *rev.*, 59
Società Italiana per il Progresso delle Scienze (Ricchieri), *bibliogr.*, 200
Soils
  New Jersey, southern (Bonsteel), *bibliogr.*, 272
  Wisconsin, several surveys (Whitson and others), *bibliogr.*, 189
Sonora, Mex.
  Resources (García y Alva), *bibliogr.*, 424
Sonoran Desert, *note*, 262, 263
Sorre, Maximilien, 274
Sources, original, 333
South
  Live-stock raising, 88
  Southeastern United States, showing distribution of long-leaf pine (map), 82
  Southern long-leaf pine belt, The (with maps and ills.) (Emerson), 81-90
South America
  Fell-fields, 237
  Panamericanismo, El: Su pasado y su porvenir (Calderón), *rev.*, 127
  Petroleum resources, *note*, 182
  Trade opportunities, 79
  See also Americas, The
South-Central states
  Bibliography, 119-120, 423
Southern Slavs. *See* Yugo-Slavs
Southwest
  Migratory tenant farmers (Leonard), *bibliogr.*, 120
  Prehistoric architecture (Fewkes), *bibliogr.* 190
Spain
  Railways across the Pyrenees proposed, *note*, 346
  Young coasts, The, of Annam and northern Spain (Davis), 176-180
Spalding, G. R., 63
Sphagnum, 159, 166
Spinden, H. J.
  Personal, 267
Spinning silk in China, 15
Spitsbergen
  Cartography, 316
  In relation to northern Europe (map), 313
  Minerals, 317, 321
  Political status, 320
  Sketch map (map), 313
  Spelling of the name, 311
  Spitsbergen, *terra nullius* (with map) (Brown), 311-321
Spring
  Last killing frost in the United States (with map), 341
Spring Valley, Cal., topographic sheet, *map*, 190
Springer, J. M.
  Pioneering in the Congo, *rev.*, 430
Stanoyevich, M. S.
  The ethnography of the Yugo-Slavs, 91-97
Staratchin, 315
Starr, Frederick, 187
Steamer Bay, Alaska, *map*, 351
Stefánsson, Vilhjálmur
  Daly medal, *notes*, 49, 411
  "Living off the country" as a method of Arctic exploration (with ills.), 291-310
  Medals received, 268
  On the Alaskan Rockies, 410
  Portrait dragging a seal (ill.), 298
Stella, Augusto, 124
Steppes
  Asiatic, value (Blanc), *bibliogr.*, 278
Stewart, Elihu, 409
Stirling-Maxwell, J. M., 426
Stockton, Utah, topographic sheet, *map*, 190
Storkersen, Storker, 310
Störmer, Carl, 429
Storms
  As climatic control in the United States, *note*, 263
  Magnetic, theory of (Chapman), *bibliogr.*, 197
  Scandinavia (Hildebrandsson), *bibliogr.*, 429
  Texas twisters (Lamoree), *bibliogr.*, 120
  Tripoli (Eredia), *bibliogr.*, 278
  See also Meteorology
Storrer, H. H., 61
Stourbridge fair, 76, 79
Strabo (Lulofs), *bibliogr.*, 200
Strahan, Aubrey, 426
Strasbourg, 282
Strathcona Park, 409
Strawberries on Southern cut-over pine land, 87 (ills.), 88
Stromer, Ernst, 278
Stuck, Hudson, 411
Students Army Training Corps
  Maps and block diagrams for, 5
Sudan
  Anglo-Egyptian Sudan, *map*, 60
  Magnetic survey (Hurst), *bibliogr.*, 193
Sudworth, G. B., 353
Suez Canal
  Weather and war near (Ward), *bibliogr.*, 61

Sullivan, L. R., 271
Sulphur
  Louisiana and Texas deposits (Pogue), *bibliogr.*, 120
Sumerians, *note*, 51
Sun
  Solar variation, periodicity (Abbot), *bibliogr.*, 197
Superior, Lake
  First railroad to Mississippi River (Shippee), *bibliogr.*, 189
Surgical dressings, 159, 166
Surveying
  Bibliography, 62
  Resection (McCaw), *bibliogr.*, 63
  Snow surveying, Nevada (Church), *bibliogr.*, 55
  Tables and formulas (Gannett), *bibliogr.*, 63
  Tacheometer surveying, etc. (Eliot), *rev.*, 62
  See also U. S. Geological Survey
Sutton, C. W., 425
Svalbard, 312
Swanton, J. R., 120
Sweden
  Bibliography, 428
  Coalfields of Scania (Grönwall), *bibliogr.*, 428
  Drought of 1914 and effect on lakes, *bibliogr.*, 429
  Economics (Frahne), *bibliogr.*, 428
  Finnish relations, 362, 368, 375, 376
  Water level prediction (Wallén), *bibliogr.*, 429
  Water system (Wallén), *bibliogr.*, 429
  Winter of 1917 (Rabot), *bibliogr.*, 429
Swedes
  In Spitsbergen, 316, 319, 320
Switzerland
  Bibliography, 191, 192
  Communications (Rodríguez), *bibliogr.*, 191
  Italian, 143
  Political geography (Hauser; Lorenzi), *bibliogr.*, 191
  Temperature variation (Horwitz), *bibliogr.*, 191
  Tourist guidebook (Tschudi), *bibliogr.*, 192
Sykes, F. H., 266
Sylvanus' projection (map), 257
Syria
  Control, 28
Syrmia, 96
Szechwan
  Proposed railroad to tap Red Basin, *note*, 185-186

T

Tacheometer
  Tacheometer surveying, with special notes, etc. (Eliot), *rev.*, 62
Tahawus, Mt. *See* Marcy, Mt.
Tai, Tse Tsan, 195
Taiping River, *note*, 186
Tammerfors, 366
  Mills (ill.), 371
Tanks (India). *See* Reservoirs
Taramelli, Torquato, 192
Tarentaise
  Blanchard, R., *bibliogr.*, 273
Tascotal Mesa, Tex., topographic sheet, *map*, 121
Tatars
  Tribes (Dingelstedt), *bibliogr.*, 195
Taylor, A. E., 189
Taylor, A. H. E.
  The future of the Southern Slavs, *rev.*, 274
Taylor, Griffith, 126
  Air routes to Australia (with maps), 256-261
Taylor, Norman
  Flora in the vicinity of New York, *rev.*, 271
Teachers, need of trained, in geography, 40-41
Tee-Van, John, *note*, 183
Teele, R. P., 271
Tees
  Study in river development (Fawcett), *bibliogr.*, 426
Teggart, F. J., 360
Telescope Peak, 406
Temperature
  Aviation and, 154
  British Isles, abnormal (Bryant), *bibliogr.*, 355
  Continentality and (Brooks), *bibliogr.*, 128
  Egypt and Italy (Eredia), *bibliogr.*, 277
  Hot spell of August, 1918 (Henry), *bibliogr.*, 270
  Liberia, 389
  New Orleans (Cline), *bibliogr.*, 119
  Subterranean, *note*, 417
  Switzerland (Horwitz), *bibliogr.*, 191
  See also Cold
Tenali, Mt., 411
Tenaya, Lake, 384
  Peaks above (ill.), 385
  Situation (ill.), 386
Tennessee River
  Tennessee River, The, as the road to Carolina: The beginnings of exploration and trade (Crane), *rev.*, 119
Tequesquite (Flores), *bibliogr.*, 424
Terraces
  River terraces in New Zealand (Cotton), *bibliogr.*, 125
Terrestrial magnetism
  São Francisco basin, Brazil (Costa), *bibliogr.*, 57
  South Australia (Dodwell), *bibliogr.*, 125
  Survey of Egypt and the Sudan (Hurst), *bibliogr.*, 193
Tewa Indians
  Ethnobotany (Robbins and others), *bibliogr.*, 190
Texas
  Addicks, Agua Fria, Barwise School, Bone

Texas *(continued)*
    Spring, Buck Hill, Cypress, Dryden Crossing, Electra, Hood Spring, Indian Wells, Iowa Park, Jordan Gap, Nine Point Mesa, Reagan Canyon, Santiago Peak, Tascotal Mesa, and West Wichita Falls topographic sheets, *maps*, 121
  Bullis Gap and Dove Mountain topographic sheets, *maps*, 423
  Geology (Udden and others), *bibliogr.*, 120
  Geology of Camp Bowie (Shuler), *bibliogr.*, 120
  Santo Tomas cannel coal (Ashley), *bibliogr.*, 119
  Spread, The, of timbered areas in central (Foster), *rev.*, 119
  Sulphur (Pogue), *bibliogr.*, 120
  Twisters (Lamoree), *bibliogr.*, 120
  Winter, N. O., *bibliogr.*, 423
Texas-Oklahoma
  Burkburnett and Clara topographic sheets, *maps*, 121
Texcoco, Lake
  Saline deposits (Flores), *bibliogr.*, 424
Thierry, René, 430
Thomas, G. H., 258
Thomas Peak, 406
Thompson, Carl, 189
Thomson, J. A., 200
Thoroddsen, Th., 237
Threshing rice in China, 18
Thrum, T. G., 358
Thunderstorms. *See* Storms
Thurn, Everard im, 359
Tiahuanaco, 55
  Civilization (Nordenskiöld), *bibliogr.*, 425
Tibetan Plateau, 413
Ticino, 145
Tidal river and underground water variations (Bilham), *bibliogr.*, 355
Tierra del Fuego
  Peat beds (Bonarelli), *bibliogr.*, 122
Timber
  Lumbering in long-leaf pine belt, 82
  Southern pine, 81
  See also Forests
Time
  Mexico (Gallo), *bibliogr.*, 424
Tin
  Cornwall, early trade (Whitley), *bibliogr.*, 426
Tioga Lake, 386
Tioga Pass, view from summit (ill.), 381
Tioga Road
  Alpine meadow (ill.), 377
  Freight team (ill.), 382
  Main crest of the Sierra Nevada (ill.), 383
  Tioga Road, The, across the Sierra Nevada (with map and ills.) (Belden), 377-386
  Tioga Road, The, and connections across the Sierra Nevada (map), 378
Tisdale, Alice
  Enchantment, The, of the old order (with ills.), 11-23
Titicaca, Island of
  Bandelier, A. F., *bibliogr.*, 56
Titicaca Basin
  Fairs, 77, 78, 79
Tobolsk (government)
  Journey in (Gorodkov), *bibliogr.*, 278
Tolley, H. R., 340
Tolomei, Ettore, 124
Tonkin, 176
  Structure and relief (Sion), *bibliogr.*, 358
Tooele Valley, Utah
  Indicator significance of vegetation, etc. (Kearney and others), *rev.*, 189
Topographic maps. *See* United States topographic map; *see also under* Alaska; Egypt; India
Torlaks, 95
Tormenta, *note*, 113, 114
Tornadoes
  Travel (Shaw), *bibliogr.*, 198
Torngats, 403
Tortugas. *See* Dry Tortugas
Tovar, W. C., 56
Towers, J. H., *note*, 420
Towns. *See* Cities
Trade. *See* Commerce
Trade wind
  Australia, 259
Transhumance
  Waldensians in the Pellice valley, *note*, 265
Transportation
  Development, The, of transportation in modern England (Jackman), *rev.*, 58
  Fairs and, 66
  Trade and, early connection, 77
  See also Canals; Railroads; Roads; Routes, etc.
Trapping
  Spitsbergen, 314
Travels
  Arctic, 291, 297
  Diary of a journey across the Sahara in the eighteenth century (Hornemann), *bibliogr.*, 278
  Palestine, 32
  Tripoli (Brizio), *bibliogr.*, 277
Treaties, European, bearing on United States history to 1648 (Davenport), *bibliogr.*, 64
Trees. *See* Forests
Trentino, 132, 139
  Individuality, 142
  Nationalities, 141
Trieste, 136
Tripoli
  Storms (Eredia), *bibliogr.*, 278
Tripolitania
  Journey in (Brizio), *bibliogr.*, 277
  Snow (Eredia), *bibliogr.*, 277
Tromsö, 318, 321

Tropics
  Agriculture (Proceedings, etc.; Wilcox), *bibliogr.*, 199
  Hygiene, 400
  Nervous strain of life, 401
  White residents in Hawaii, *note*, 418
Trotter, Alessandro, 278
Trout, L. E., 120
Troutdale, Ore., topographic sheet, *map*, 353
Tsanoff, R. A., 276
Tschudi, Iwan von, 192
Tumbes. *See* Piura-Tumbes region
Tundra
  Canada, Eskimo camp (ill.), 294
  Caribou feeding (ill.), 308
Tungchwan, *note*, 186
Tunis
  Mohammedan graves (Olufsen), *bibliogr.*, 193
Tunnel, English Channel (Fox), *bibliogr.*, 58
Tuolumne Meadows, 384, 385
  Flowery expanse (ill.), 380
Tuolumne River, 383, 385
Turkestan
  Russian, scientific mission, report (Bartold), *bibliogr.*, 357
Turkey in Asia
  Bibliography, 60
  War, The, and the Bagdad Railway; The story of Asia Minor and its relation to the present conflict (Jastrow), *rev.*, 60, 360
  See also Palestine; Syria
Turks
  Influence on Oriental trade routes (Lybyer), *bibliogr.*, 60
Turner Ranch, Cal., topographic sheet, *map*, 353
Twitchell, R. E., edit.
  Historical sketch of Governor William Carr Lane, together with diary, etc., *rev.*, 190
Tyrol, 142
  Map (in series of base maps of problem areas), opp. 8

U

Udden, J. A., 120
Uganda
  Ethnological expedition, *note*, 347
Uintah Range, 404
Umlauff, A. F., 425
Umpleby, J. B., 108
Unadilla, N. Y., topographic sheet, *map*, 272
Underground water variation near a tidal river (Bilham), *bibliogr.*, 355
United Kingdom. *See* British Isles; England; Great Britain
United States
  Bibliography, 270
  Citizenship, Asiatic (Gulick), *bibliogr.*, 270
  Climate and crops, *note*, 345
United States *(continued)*
  Coal in 1916 (Lesher), *bibliogr.*, 271
  Domestic independence in minerals (Smith), *bibliogr.*, 271
  European treaties bearing on United States history to 1648 (Davenport), *bibliogr.*, 64
  Export lumber trade (Pratt), *bibliogr.*, 271
  Fell-fields of eastern, 239
  Foreign commerce, 1917, *bibliogr.*, 271
  Frost, first killing, in autumn (with map), 342, 343
  Frost, last killing, in spring (with map), 341
  Frost in the United States (with maps) (Ward), 339-344
  Growing season, length (with map), 343, 344
  High peaks in western, 403
  Irrigation (Teele), *bibliogr.*, 271
  Localization of industry (Keir), *bibliogr.*, 271
  Major controls of climates, *note*, 263
  Major controls of climates (Ward), *bibliogr.*, 271
  National highways (Mulford and others), *map*, 271
  Negro migration (Horwill), *bibliogr.*, 271
  Normal annual precipitation map of the United States (Van Cleef), *rev.*, 269
  Racial types (Sullivan), *bibliogr.*, 271
  Rain, mean annual probability (map), 47
  Rainy days, average annual number (map), 44
  Rainy days and rain probability in the United States (with maps) (Ward), 44-48
  See also America
U. S. Geological Survey
  War work, *note*, 181
U. S. Reclamation Service
  Reclaiming the arid West: The story of the United States Reclamation Service (James), *rev.*, 54
United States topographic map
  Alabama, Kentucky, Kentucky-West Virginia, Mississippi-Louisiana, Texas, and Texas-Oklahoma sheets, *maps*, 120-121
  California, Idaho, Montana, and Utah sheets, *maps*, 190
  California, Idaho-Utah, Montana, New Mexico, Oregon, Washington, and Wyoming sheets, *maps*, 353
  Illinois, Indiana-Ohio, Michigan, and Ohio sheets, *maps*, 189
  Maine, New Hampshire-Maine, and New York sheets, *maps*, 272
  Texas sheets, *maps*, 423
U. S. Weather Bureau
  Frost data, 339
Universities, geographical study in, 39, 40
Unstead, J. F., 63
Upper Silesia, 283
Urania, La., 85
Uros Indians, *note*, 113

- Uruguay
  - Bibliography, 121-123
  - Geology, etc., bibliography (Marstrander), *bibliogr.,* 123
  - Military geographic service (Mato), *bibliogr.,* 123
  - *See also* Montevideo
- Utah
  - Indicator significance of vegetation in Toole Valley (Kearney and others), *rev.,* 189
  - Irrigation waters, composition (Greaves and Hirst), *bibliogr.,* 352
  - Stockton topographic sheet, *map,* 190
- Uvea. *See* Wallis Islands

V

- Valganna
  - Vanni, M., *bibliogr.,* 124
- Van Cleef, Eugene
  - Normal annual precipitation map of the United States, *rev.,* 269
- Vancouver Island, 409
- Van Hise, C. R.
  - Obituary, 53
- Vanni, Manfredo, 124
- Van Orstrand, C. E., *note,* 417
- Vaughan, T. W., 108
- Vegetation
  - Breckland (Farrow), *bibliogr.,* 425
  - Dry Tortugas, *note,* 417
  - Dunes at San Francisco, Cal. (Ramaley), *bibliogr.,* 352
  - Durham (Jeffreys), *bibliogr.,* 426
  - Esthwaite Water (Pearsall), *bibliogr.,* 426
  - Indicator significance of vegetation in Toole Valley, Utah (Kearney and others), *rev.,* 189
  - Raised bog (ills.), 160, 163
  - Württemberg, Baden, and Hohenzollern (Eichler and others), *bibliogr.,* 427
  - *See also* Phytogeography; Plants
- Venezia Giulia, 132
  - Place names, *bibliogr.,* 124
- Verendrye family
  - Additional material (Robinson and others), *bibliogr.,* 189
- Vergnes, Ch., 62
- Verhoeff, Mary, 120
- Vermont, Ill., topographic sheet, *map,* 189
- Vespucci, Amerigo
  - Biography, etc. (Vignaud), *bibliogr.,* 200
- Vesuvius
  - Eruption begun in 1913 (De Fiore), *bibliogr.,* 123
- Vicksburg, Mississippi-Louisiana, topographic sheet, *map,* 120-121
- Victorio, N. M., topographic sheet, *map,* 353
- Vidal de la Blache, Paul, 428
  - Gallois, L., on, *bibliogr.,* 200
  - On human agglomerations, distribution, etc., *note,* 52
  - Proposed subdivisions of France (with map), *note,* 115, 116
- Vignaud, Henry, 200
- Villavicencio, Argentina
  - Mineral waters (Alvarez), *bibliogr.,* 121
- Vilque, 74, 76
  - Fair, 78
- Vinassa de Regny, Paolo, 192
- Vinland
  - Question (Gagnon), *bibliogr.,* 272
- Vistula River, 283, 284, 285, 286
- Vizille, French Alps
  - Allix, A., *bibliogr.,* 273
- Vlakhs
  - Adriatic coast (Giuffrida-Ruggeri), *bibliogr.,* 275
- Vltava River, 290
- Volcanoes
  - Alaska (Dall), *bibliogr.,* 351
  - Hawaii (Powers), *bibliogr.,* 359
  - Hawaii, results of study (Jaggar), *bibliogr.,* 359
  - Kilauea district, Hawaii, model (Daly), *bibliogr.,* 358
  - Vesuvius (De Fiore), *bibliogr.,* 123
- Voyages
  - Ancient mariners (Smith), *bibliogr.,* 200
- Vuoksen River, 371, 373

W

- Wadsworth, M. E., 242
- Waldensians, 147
  - Study, *note,* 265
- Waldoboro, Me., 164
- Wallace, Dillon, 406
- Wallace, H. C., *note,* 416
- Walle, P., 425
- Wallén, Axel, 429
- Wallis, B. F., 120
- Wallis Islands
  - French acquisition (Blanc), *bibliogr.,* 358
- Walnut Wells, N. M., topographic sheet, *map,* 353
- Wapanucka, Okla.
  - Limestone (Wallis), *bibliogr.,* 120
- War (in general)
  - Geography in relation to (Mackie), *bibliogr.,* 64
- War, the
  - Italian front (De Filippi), *bibliogr.,* 123
  - Italian front, *map,* 124
  - Italian zone, weather controls (Ward), *bibliogr.,* 124
  - Value of climatology, 38
  - Value of knowledge of geography, 37
  - Weather controls in Mesopotamia, Palestine, etc. (Ward), *bibliogr.,* 61
  - Work of U. S. Geological Survey, *note,* 181
  - *See also* Alsace-Lorraine; Bagdad Railway; Europe; France; Germany; Peace
- War Department
  - Circular on a series of base maps prepared by the Amer. Geogr. Soc., 5
- Ward, F. Kingdon, 413
- Ward, R. DeC., 61, 107, 124, 198, 271, 345 (*note*)

Ward, R. DeC. *(continued)*
  Frost in the United States (with maps), 339-344
  On climate controls in the United States, *note*, 263
  Rainy days and rain probability in the United States (with maps), 44-48
Warming, Eugen, 233
Wasatch Range, 404
Washington
  Geographic dictionary (Landes), *bibliogr.*, 352
  Minerals (Roberts), *bibliogr.*, 353
  Port Angeles topographic sheet, *map*, 353
Washington, Lake, Ship Canal, *map*, 190
Washington, Mt.
  Contour map (map), 236
  Fell-field of Alpine Garden (ill.), 245
  Fell-fields of the massif, 242
  Lakes of the Clouds (ills.), 252, 253
  Prostrate balsam trees (ill.), 243
  Summit dome (ill.), 247
  Tree line and fell-field (ill.), 238
  Typical fell-field (ill.), 248
Water power
  Finland, 371, 373
  Great Britain (Newlands), *bibliogr.*, 426
  India (Dickinson), *bibliogr.*, 279
Waterways. *See* Canals; Inland waterways
Watson, Foster, 200
Wauters, A. J., *note*, 421
Wayne, Me., 163
Weather
  Argentine service (Clayton), *bibliogr.*, 122
  Chilean service (Knoche), *bibliogr.*, 122
  Controls over the fighting in Mesopotamia, in Palestine, and near the Suez Canal (Ward), *bibliogr.*, 61
  Duluth, Oct. 12, 1918 (map), 223
  Far East (Okada), *bibliogr.*, 195
  Inverse phenomena in the British Isles (Bonacina) *bibliogr.*, 355
  Italian war zone (Ward), *bibliogr.*, 124
  Persistence of wet and dry (British) (Newnham), *bibliogr.*, 61
  United States, average values, pressure, temperature, etc. (Gregg), *bibliogr.*, 270
  See also Climate; Climatology; Meteorology; Rainfall; Storms; Temperature; U. S. Weather Bureau
Weaving silk in China, 15
Weisgerber, H., 360
Wellington (province), N. Z.
  Coastal district of Southwestern, geomorphology (Cotton), *bibliogr.*, 125
Wells
  Deepest in the world, *note*, 417
  Queensland (Gregory), *bibliogr.*, 61
West Indies
  British, investments (Halsey), *bibliogr.*, 128
West Prussia, 283
West Wichita Falls, Tex., topographic sheet, *map*, 121
Westermann, W. L., 3
Westermarck, E., 375
Western front. *See under* War, the
Western states
  Bibliography, 55, 190, 351, 352
  Maps, 190, 353
  Reclaiming the arid West: The story of the United States Reclamation Service (James), *rev.*, 54
Whaling in Spitsbergen, 312
Wheat
  Italy, weather problem (Azzi), *bibliogr.*, 192
  Wheat problem, The (Crookes), *rev.*, 198
Wheeler, G. M., 405
Wheeler Peak, 405
Whipple, F. J. W., 198
Whitbeck, R. H., *note*, 50
White, I. C., 417
White, James (Dawson), *bibliogr.*, 351
White, S. A., 432
White Mountains
  Glaciation (Goldthwait; Johnson), *bibliogr.*, 272
White Mountains (Arizona), 406
White Mountains (California), 405
Whitford, H. N.
  Personal, 268
Whitley, D. G., 426
Whitson, A. R., 189
Wigram, E. T. A., 61
Wilbur Wright Field, 152
Wilcox, E. V., 199
Williams, E. T., 51
Williams, P. C., 115
Williamson, Kentucky-West Virginia, topographic sheet, *map*, 120
Willis, Bailey, 187
Willoughby, Sir John, 311
Wilson, Woodrow, 1
Winds
  African West Coast, 304
  As climatic control in the United States, *note*, 263
  Australasia (maps), 260, 261
  Duluth, Oct. 11-13, 1918 (diagr.), 224
  Louisiana, loess-depositing (Emerson), *bibliogr.*, 120
  Variation in France (Dunnoyer and Reboul), *bibliogr.*, 274
Winnowing rice in China, 18
Winter, N. O., 423
Wisconsin
  Soil surveys, various (Whitson and others), *bibliogr.*, 189
Wood, H. O., 359
Woodhouse, Henry
  High-altitude flying in relation to exploration (with diagrs. and ills.), 149-158
  Lecture, *note*, 181
Woods, H. C., 276
Wool
  Command of (British), *bibliogr.*, 426
World as a whole and larger parts
  Bibliography, 62, 128
  Coaling stations, *bibliogr.*, 62

World as a whole, etc. (*continued*)
  Expansion, transformation, and problem of peace, 42, 43
  Human distribution, *note*, 52
  Russia, Germany, and Asia, *bibliogr.*, 62
Worm lichen (ill.), 240
Wrangell Harbor and Highfield Anchorage, Alaska, *map*, 351
Wright, G. F., 189
Wrigley, G. M., 50 (*note*)
  Fairs of the Central Andes (with map and ills.), 65-80
Württemberg
  Vegetation study (Eichler and others), *bibliogr.*, 427
Wyoming
  Bibliography of geology (Bovee), *bibliogr.*, 55
  Como Ridge topographic sheet, *map*, 353
  Fauna (Cary), *bibliogr.*, 55

Y

Yakuts
  Sojourn among (Shklovsky), *bibliogr.*, 278
Yangtzekiang, *note*, 185
Yapp, R. H., 427
Yearbook of the Carnegie Institution, 1916, *bibliogr.*, 128
Yellow pine, 81
Yosemite Creek, 384
Yosemite Valley, 379, 383
Young, A. A., 3
Yugo-Slavs
  Economics (Annoni), *bibliogr.*, 275
  Ethnography, The, of the Yugo-Slavs (Stanoyevich), 91-97
  Future, The, of the Southern Slavs (Taylor), *rev.*, 274
  Three types, 92
  Types of houses (Dvorsky), *bibliogr.*, 275
  Unity (Cvijić), *bibliogr.*, 275
Yungay, Peru
  Coal (Léon), *bibliogr.*, 57
Yünnan-Tibet frontier
  Drainage evolution (Davis), 413-415

Z

Zadruga, 93, 94
Zagreb, 97
Zahlbruckner, A., 359
Zimmer, G. F., 280
Zionists, 29, 35
Zodiac, American (Hagar), *bibliogr.*, 360
Zonda, 113 (*note*)
Zoögeography. *See* Animals
Zweibrücken, 283

ERRATA

p. 11, line 7 from bottom: *for* mysterions *read* mysterious.
p. 41, line 8: *for* thy *read* they.
p. 59, line 7 from bottom: *for* Trail *read* trail.
p. 61, line 8 from bottom: *for* Vol. 1 *read* Vol. 6.
p. 61, line 6 from bottom: *for* Vol. 6 *read* Vol. 1.
p. 118, line 14: *for* in United States *read* in the United States.
p. 140, at end of first paragraph: *add footnote, as follows:* Cf. also: W. D. McCrackan: The Sette Comuni: A Teutonic Survival on Italian Soil, *Bull. Amer. Geogr. Soc.*, Vol. 29, 1917, pp. 168-174.
p. 187, line 2 from bottom: *for* Psysiographers *read* Physiographers.
p. 192, line 17 from bottom: *for* Boucher *read* Bouchier.
p. 220, line 2 of footnote: *for* presented *read* present.
p. 263, line 2: *for* Navada *read* Nevada.
p. 268, line 1: *for* Stefansson *read* Stefánsson.
p. 273, line 22 from bottom: *for* Bénévent, M. E., *read* Bénévent, E.
p. 275, lines 19 and 21 from bottom: *for* Cvjić *read* Cvijić.
p. 339, line 2 of footnote 1: *insert a comma after* Weather.
p. 351, line 3 of item Moffit, F. H.: *for* Rover *read* River.
p. 352, line 1 of item Merriam, J. C.: *for* palaentology *read* palaeontology.

ADDITIONAL ERRATA IN PREVIOUS VOLUMES
(Courtesy of C. E. Vail)

Vol. I

p. 53, line 2 from bottom: *for* cyanimide *read* cyanamide.
p. 54, lines 1 and 2: *for* cyanimide *read* cyanamide.
p. 78, line 2: *for* Calendonia *read* Caledonia.
p. 115, line 6: *for* stream *read* steam.
p. 171, line 1 of legend under map: *for* 1:12,000,000 *read* 1:10,700,000.
p. 231, line 6: *for* suspended *read* suspected.
p. 231, line 17: *for* insiduous *read* insidious.
p. 231, line 24: *for* was *read* were.
p. 300, line 8 from bottom: *for* slat *read* salt.
p. 305, line 28 from bottom: *for* 106° *read* 10.6°.
p. 422, line 27: *for* subsistance *read* subsistence.
p. 462, line 33: *for* aggradional *read* aggradational.
p. 469, line 25 from bottom: *for* 757-797 *read* 427-475.
p. 496, col. 2, last line: *for* peneplains *read* peneplanes.

Vol. II

p. 14, line 20 from bottom: }
p. 23, line 17: } *for* reconnaisance *read* reconnaissance.
p. 30, line 8: *for* Servia *read* Serbia.
p. 83, line 8: *for* manufacturers *read* manufactures.
p. 96, line 22 from bottom: *for* places *read* place.
p. 112, line 6 from bottom: *for* foliatious *read* foliaceous.
p. 149, line 1 of footnote 81: *for* Gibbons *read* Gibbon.
p. 214, line 18: *for* lines *read* line.
p. 243, line 16: *for* face *read* faces.
p. 291, Table III, col. 2, line 1: *for* Alllelarkean *read* Allelarkean.
p. 303, line 6: *for* tracks *read* tracts.
p. 307, last line: *for* Consantinople *read* Constantinople.
p. 499, col. 2, line 3: *for* Ergebenisse *read* Ergebnisse.
p. 500, col. 1, line 7: *for* Audrews *read* Andrews.
p. 500, col. 1, line 13: *for* Erklarung *read* Erklärung.

Vol. III

p. 21, line 4: *for* from *read* form.
p. 57, line 2 from bottom: *for* helflike *read* shelflike.
p. 147, line 29: *for* reconnaisance *read* reconnaissance.
p. 159, line 3 from bottom: *for* supplement *read* supplements.
p. 198, Table III, col. 2, sub.-col. D, heading: *for* EXCEEDS C *read* EXCEEDS A.
p. 198, Table III, col. 3, sub.-col. D, heading: *for* EXCEEDS C *read* EXCEEDS A.
p. 329, line 7 from bottom: *for* Am. *read* Ann.
p. 392, line 5 from bottom: *for* Hrdlicka *read* Hrdlička.
p. 393, line 6 from bottom: *for* Pockocke *read* Pococke.
p. 410, lines 4 and 5: *for* adaptions *read* adaptations.
p. 493, line 7 from bottom: *for* Wedel *read* Weddel.
p. 534, col. 1, line 27: *for* Gunsaulaus *read* Gunsaulus.

GETTY RESEARCH INSTITUTE
3 3125 01024 7522